Integrity - Service - Excellence

USAF Viable Combat Avionics Initiative Implementation

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Bottom Line Up Front

- Avionics is a key to future capabilities
- Avionics cost trends are in the wrong direction
- Viable Combat Avionics (VCA) initiative
  - Our approach to a solution
- VCA key: Incentivize long term performance and affordability into the contract at hand
  - Best Value Methodology (BVM) key enabler
    - Evaluate/provide incentives for ease of change
    - Evaluate/provide incentives for ease of verification
- VCA being implemented on aircraft and subsystems

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Agenda

- **Aircraft / avionics viability challenges**
- **Viable Combat Avionics (VCA) initiative**
- **Efforts to date**
- **Closing comments**

USAF Fleet Viability Strategy

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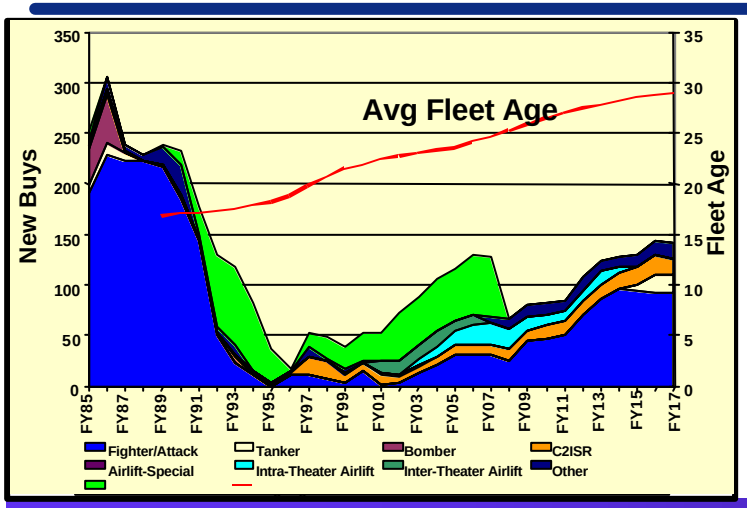

Acquire

Replace

Sustain and Upgrade

Divest

Retire

According to a RAND study, the Air Force has sufficient funds to adequately maintain about 4,300 of its approximately 6,200 aircraft.

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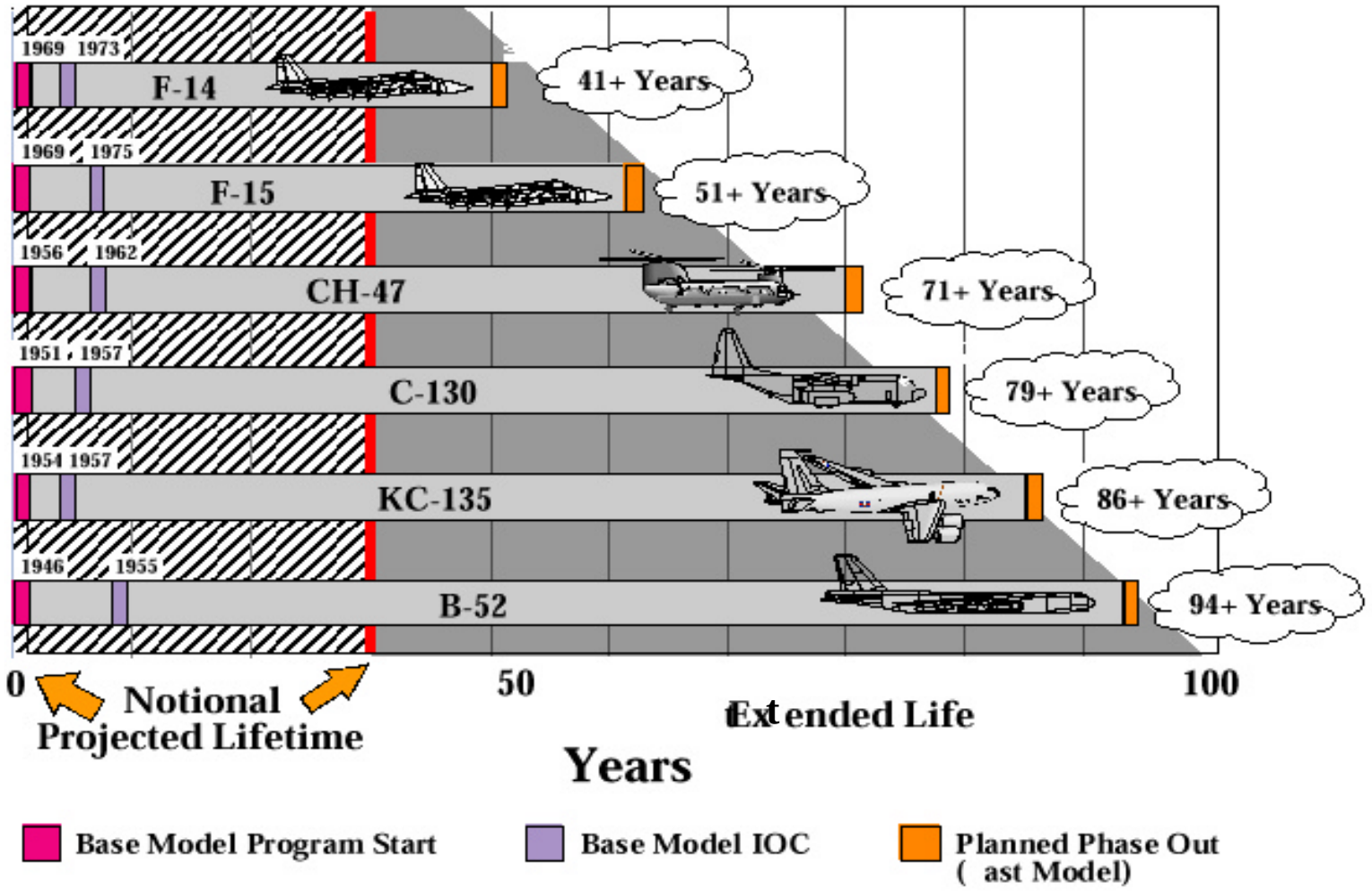
Weapon System Life Extensions



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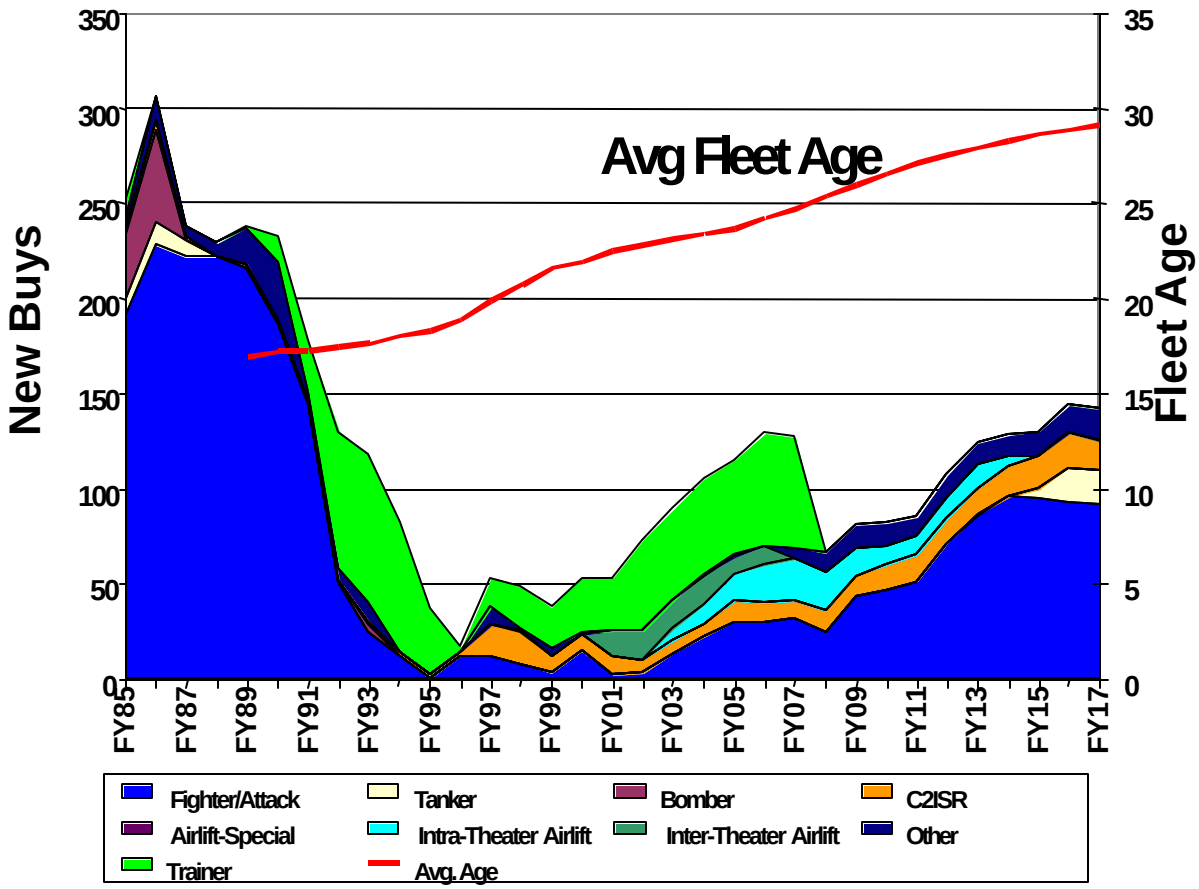
Aging Fleet & Avionics Trends Impact to Sustainment

Fleet utilization beyond design life results in:

- ***Diminishing manufacturing sources***
- ***Rising repair costs***
- ***Higher cannibalization rates***



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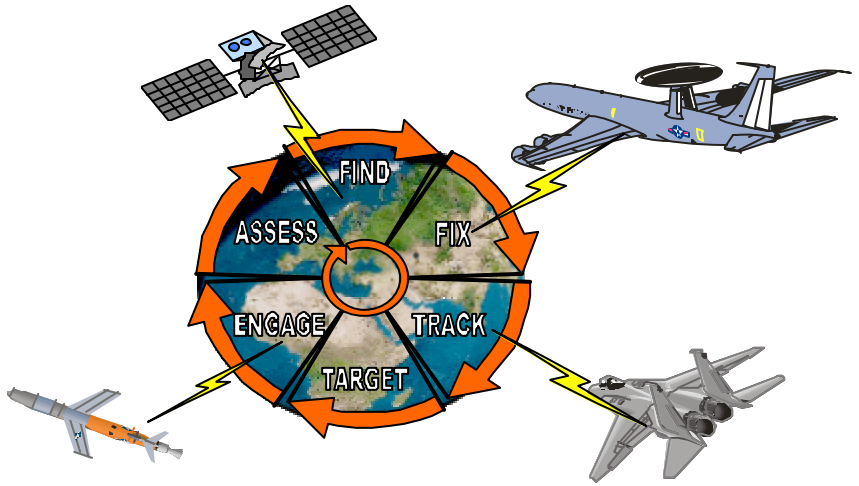
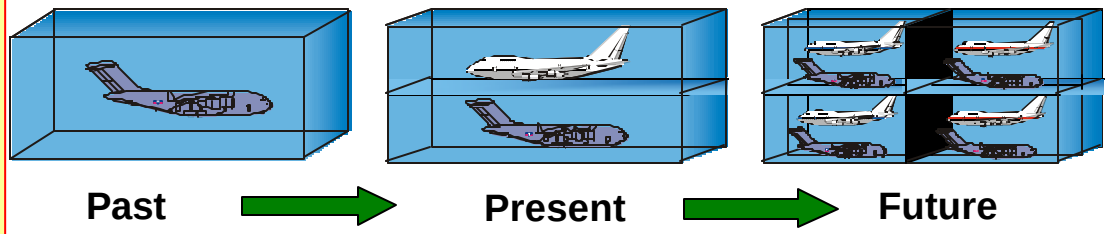
Aging Fleet & Avionics Trends Future Upgrade Challenges

- *Today's architectures must sustain continuous growth*
- *Legacy avionics under continuous pressure to add capability*
- *Funding strategies & systems engineering must address architecture life cycle affordability*





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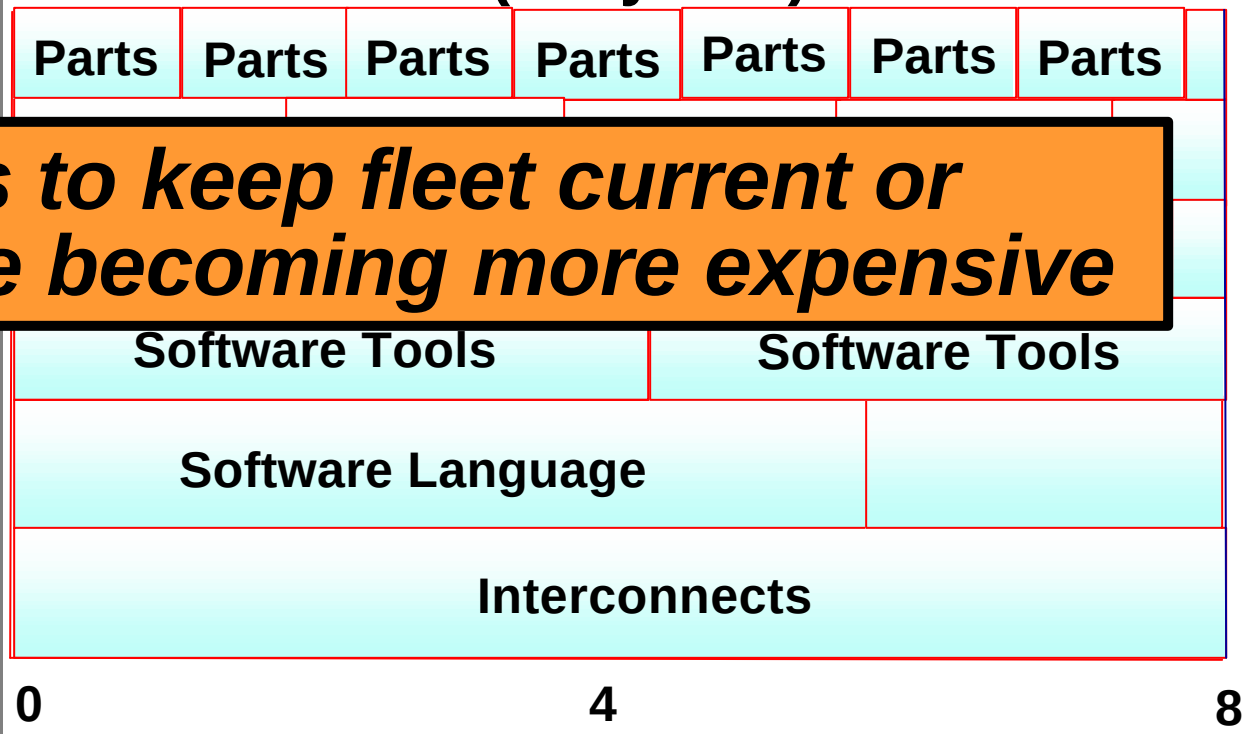
Avionics Development Time and Technology Turnover Trends

Current Designs

- *Not responsive to technology turnover*
- *Of… be… pr…*
- *Expensive to update for producibility & sustainment*
- *Hard to verify (time and $$)*

Development & Fielding Period (~ 8 years)



Efforts to keep fleet current or to upgrade becoming more expensive

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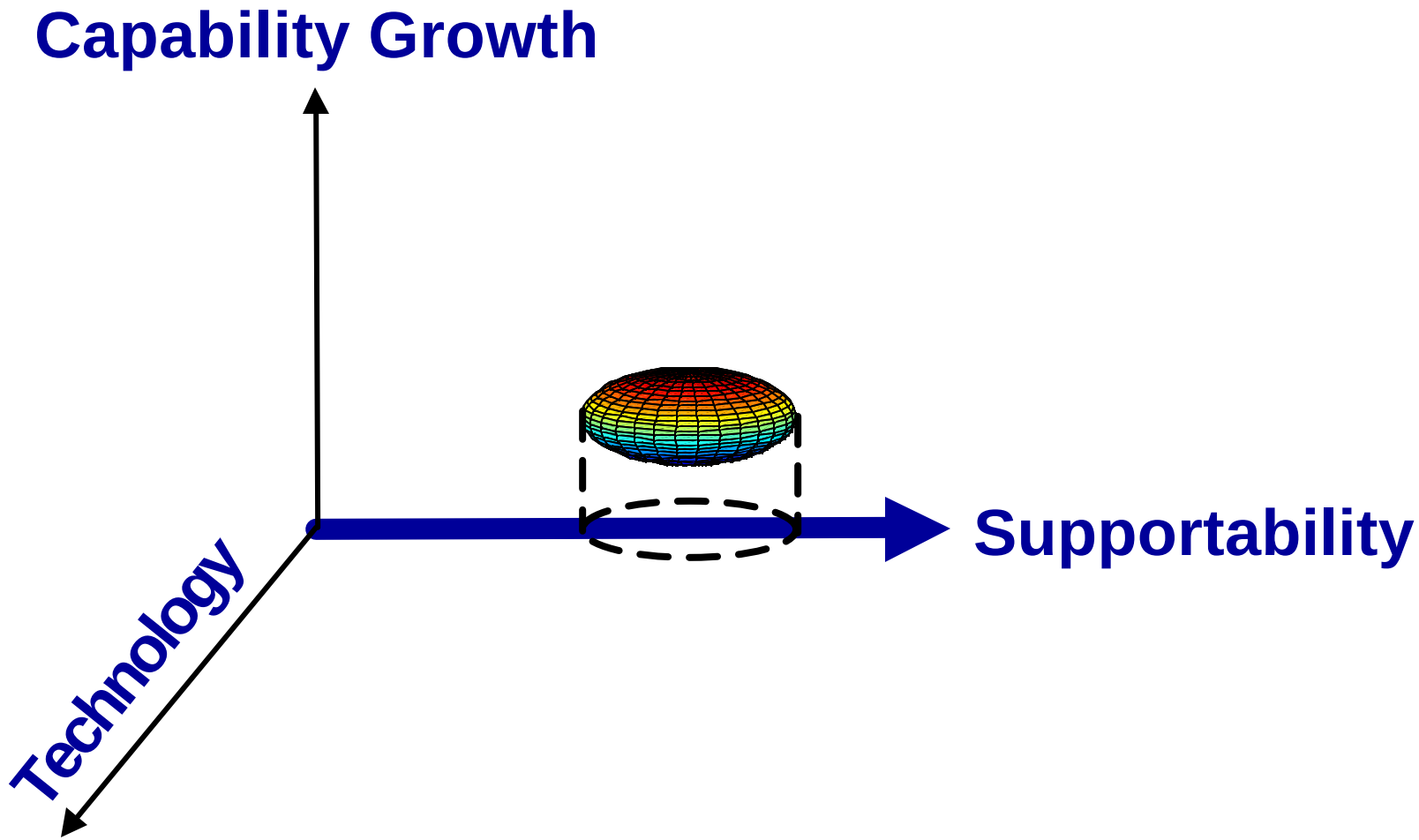
Avionics Viability
Legacy View of Issues



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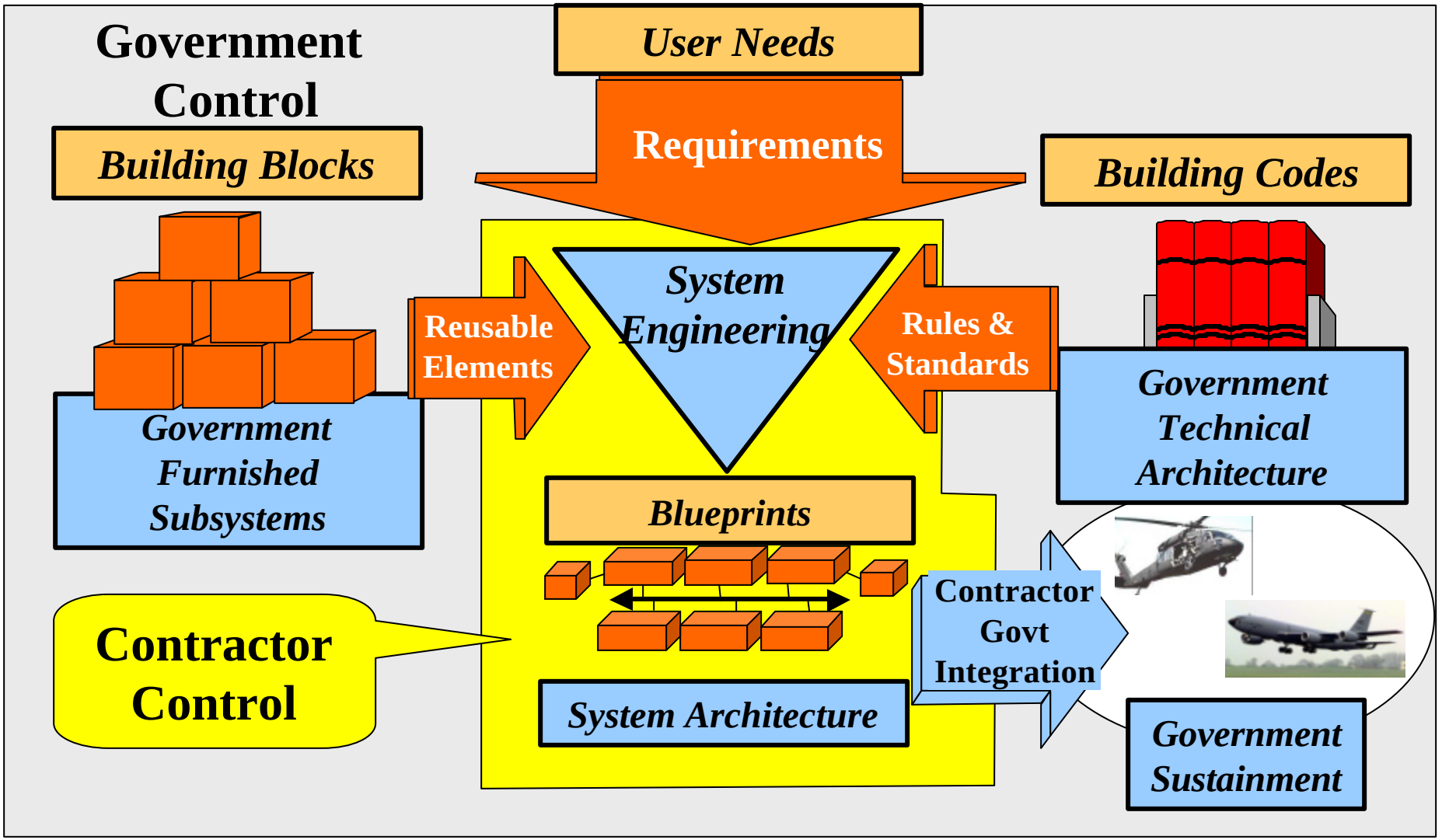
Old Life Cycle Model



Traditional Program Plan

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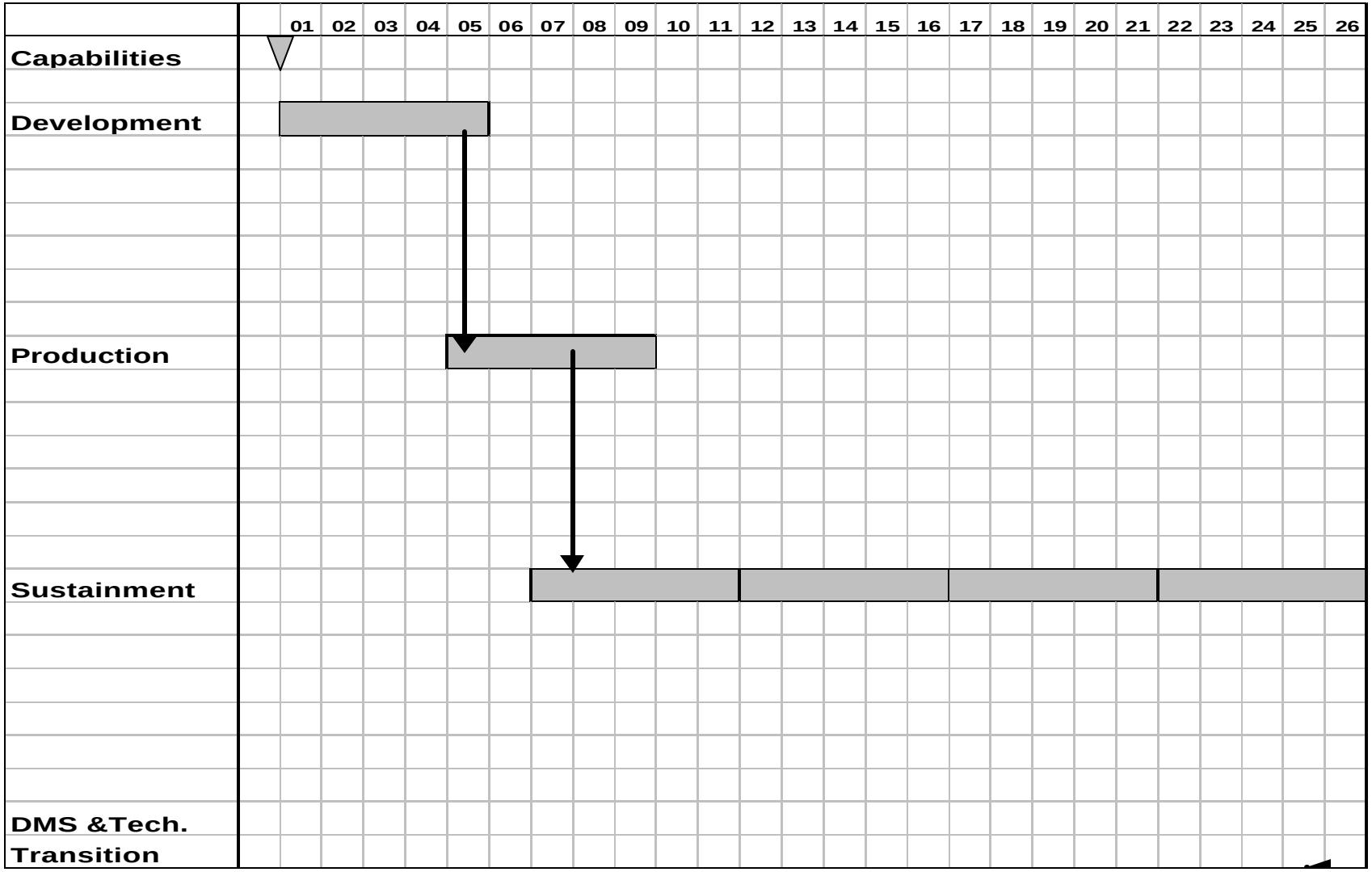

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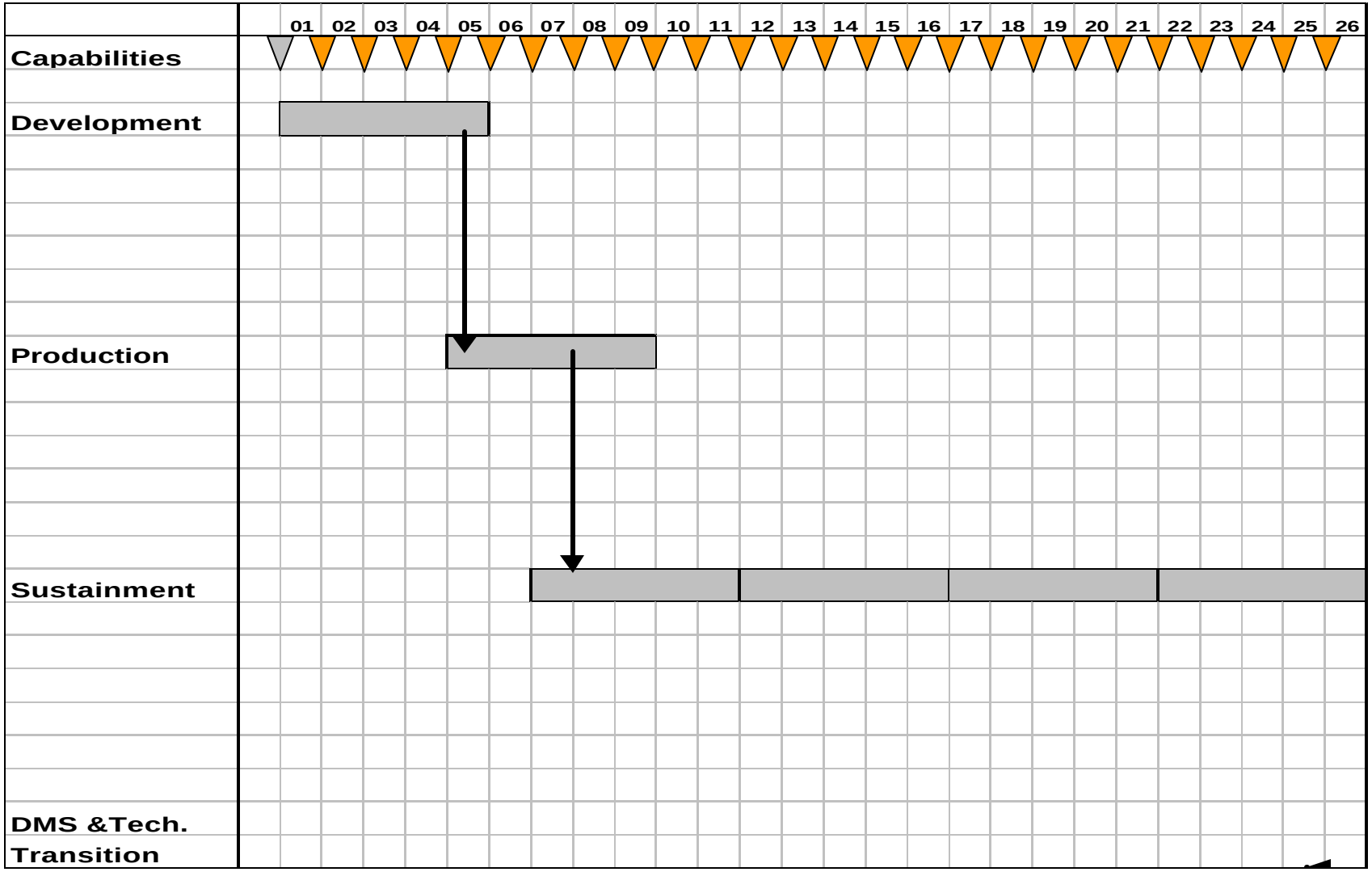
Desired Operational Capability Updates



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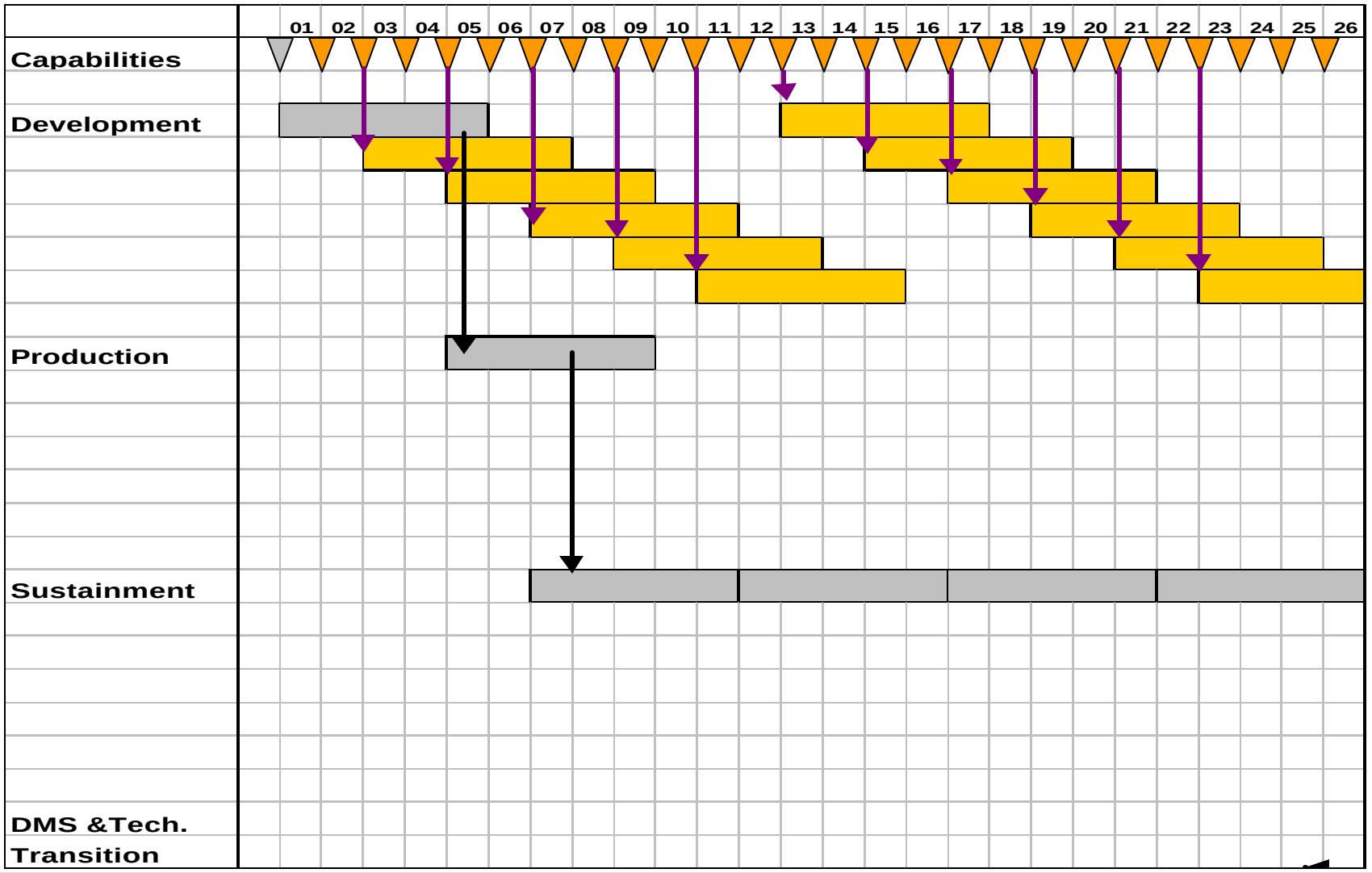
Operational Capability Updates Development Changes



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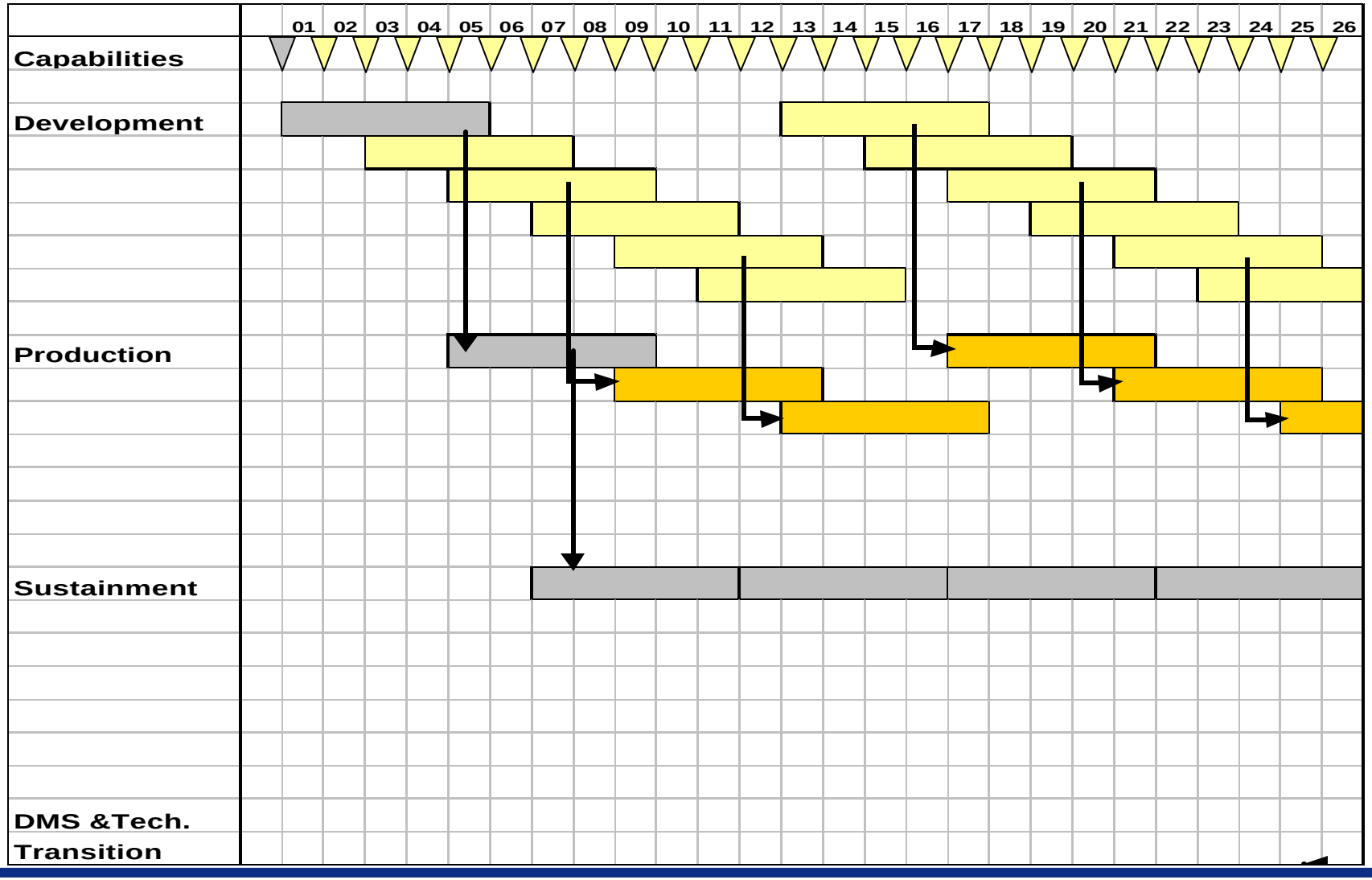
Operational Capability Updates
Production Configurations



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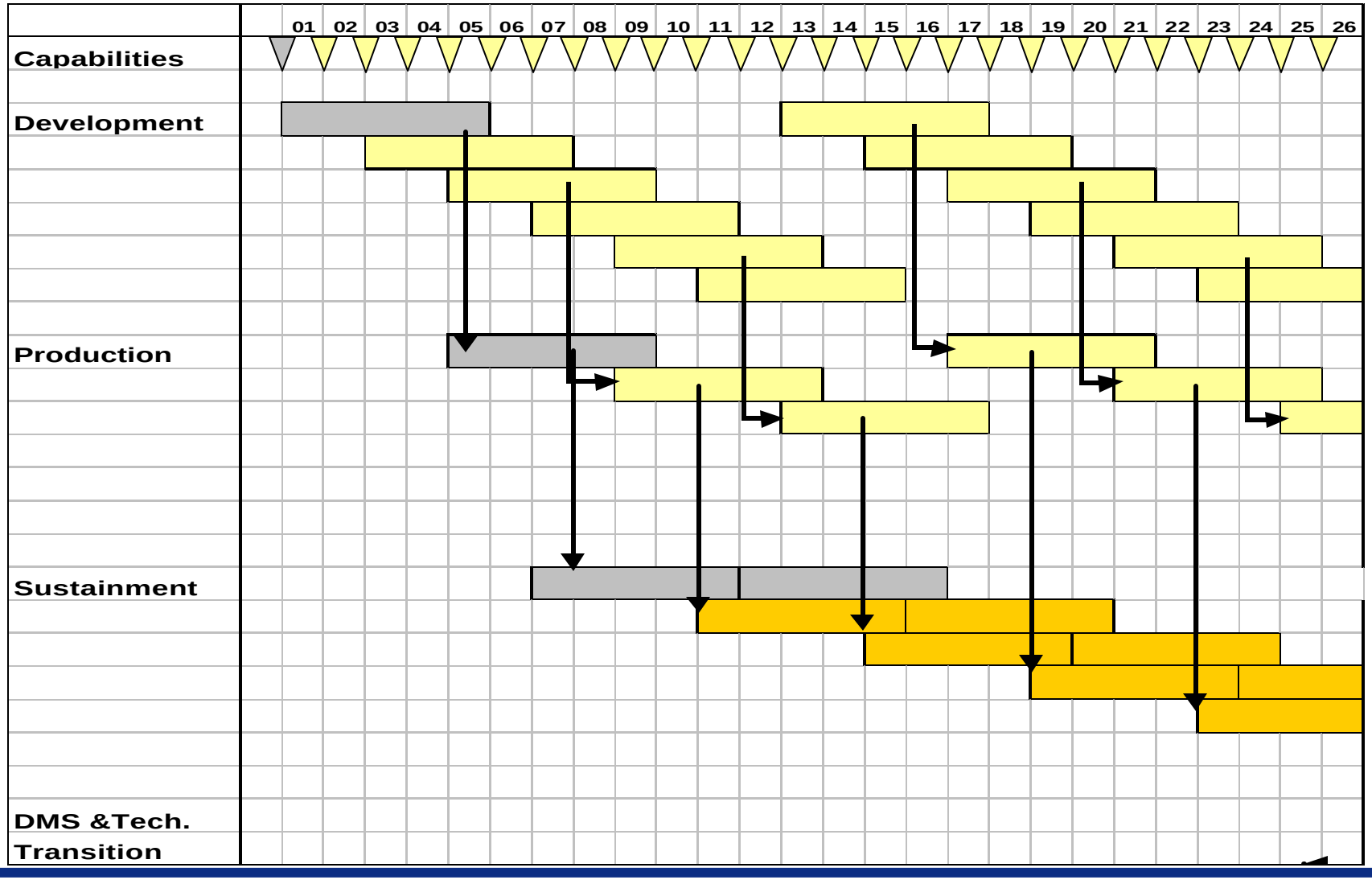
Operational Capability Updates Sustainment Configurations



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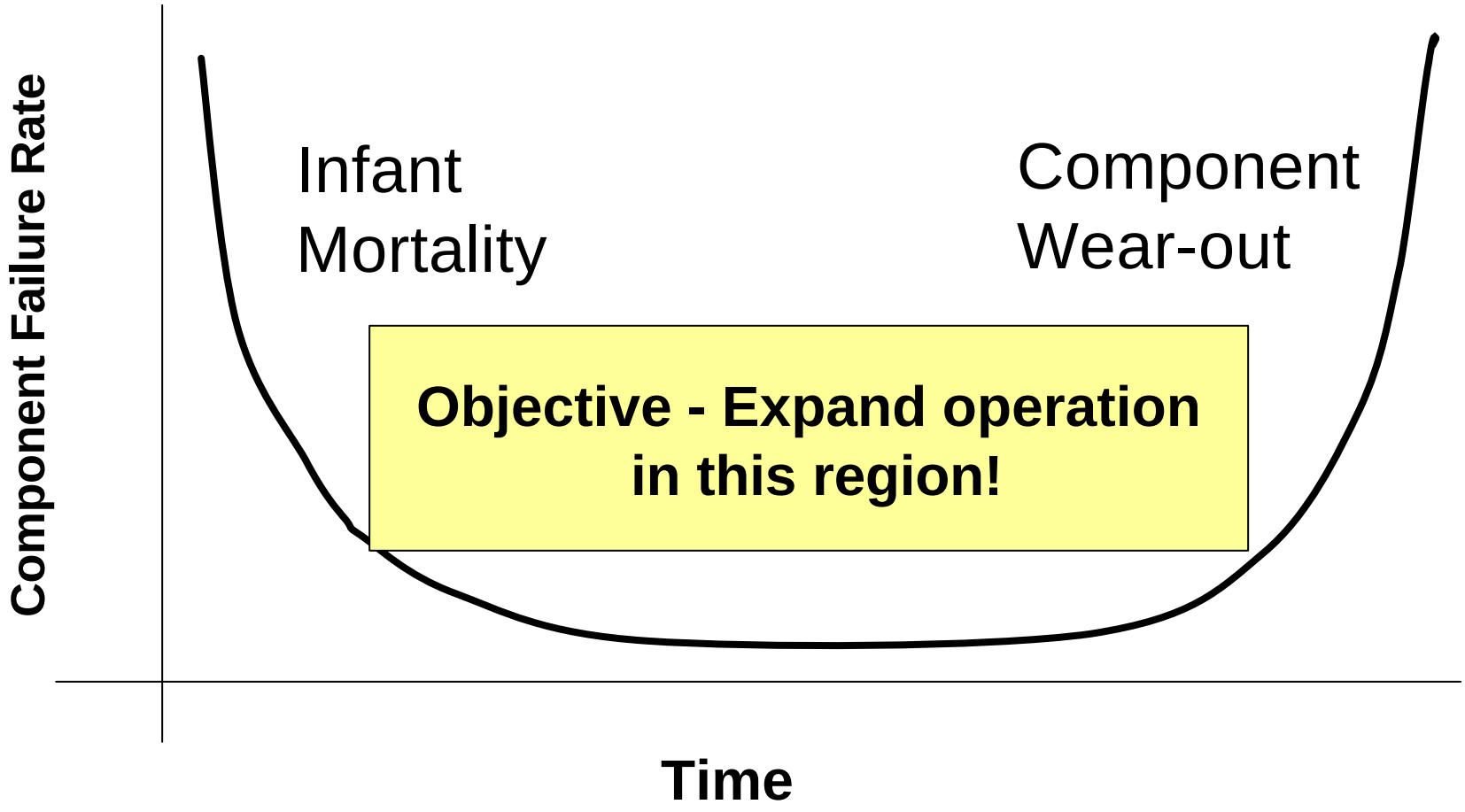
Legacy Avionics Life Cycle Cost Driver: Component Reliability



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Legacy Strategies Not Working

- **Mandated growth margins – Never sufficient**
- **Mandated architectures – Now obsolete**
- **Mandated standards – Now outdated**
- **Mandated common subsystems – Cannot produce, grow capability, nor affordably sustain**

Limited agility of avionics and ability to maintain pace with technology revolution

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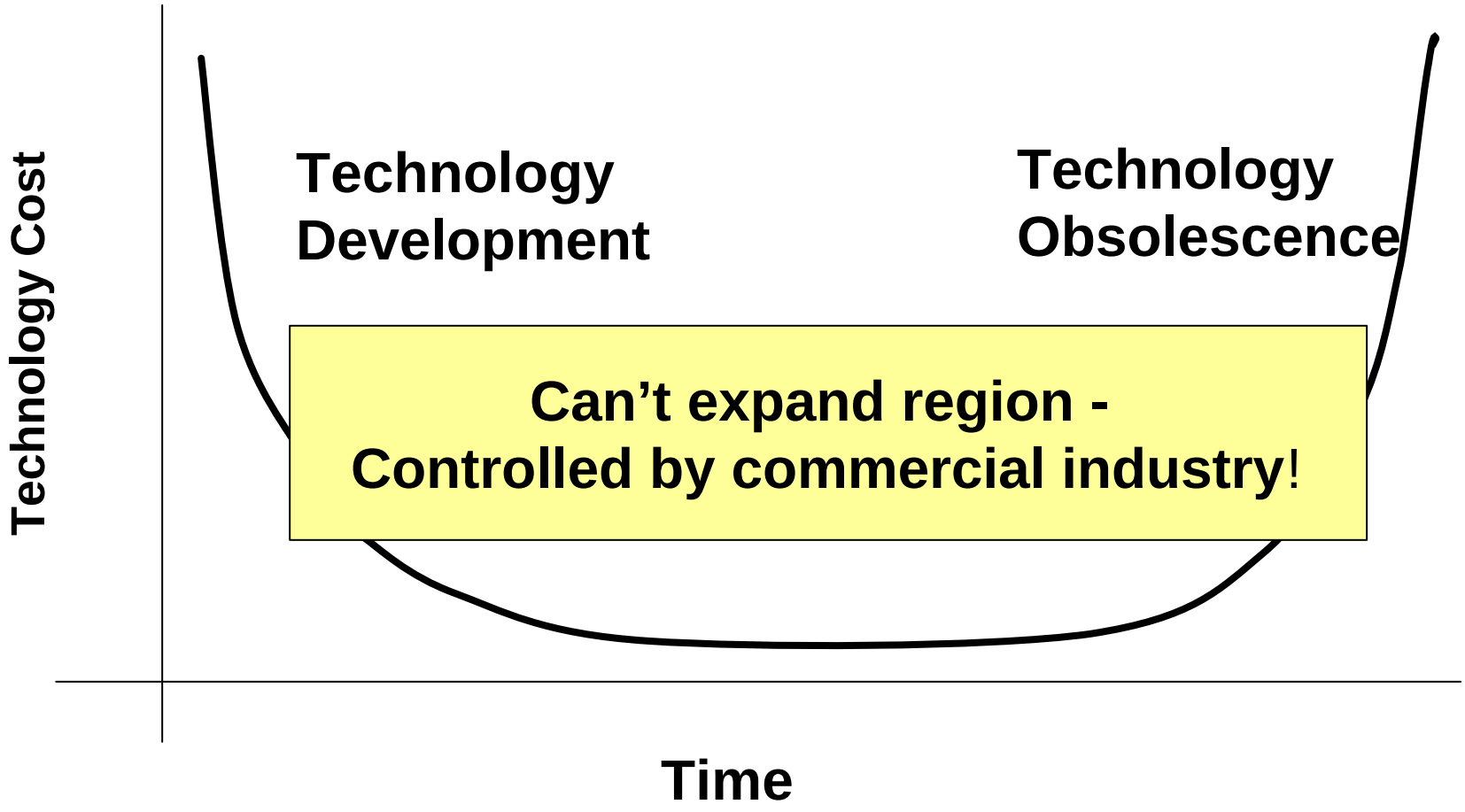
Current Avionics Life Cycle Cost Driver: Technology Life Cycle



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Trend Impacts

- Costs to upgrade systems are increasing
- System upgrade cycle time is increasing
- Developed systems not producible
- Sustainment costs are increasing

USAF can no longer afford to keep fleet current or upgrade to needed capabilities, i.e., *not viable*

DMS / Technology Impacts

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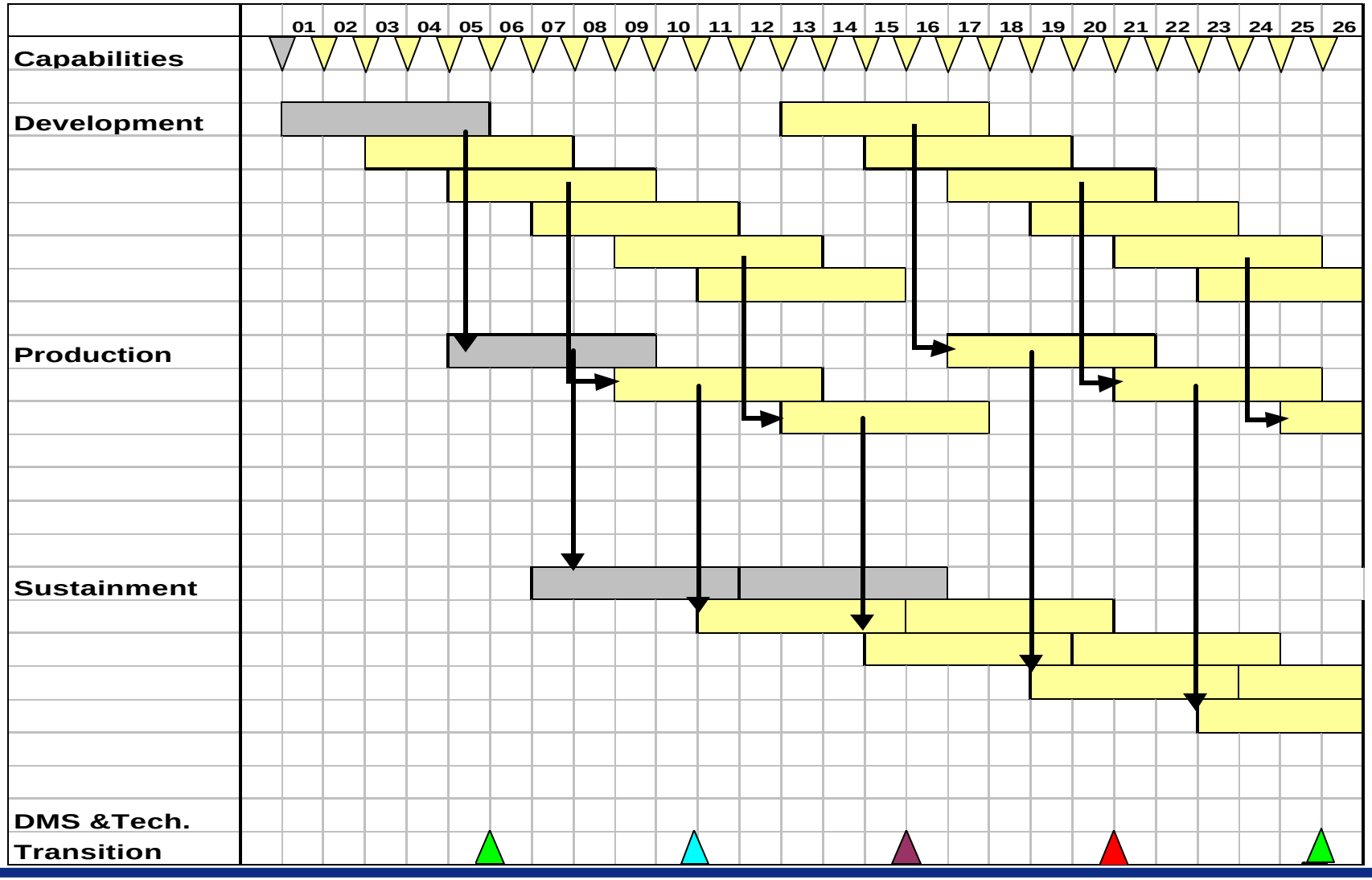

DMS / Technology Impacts

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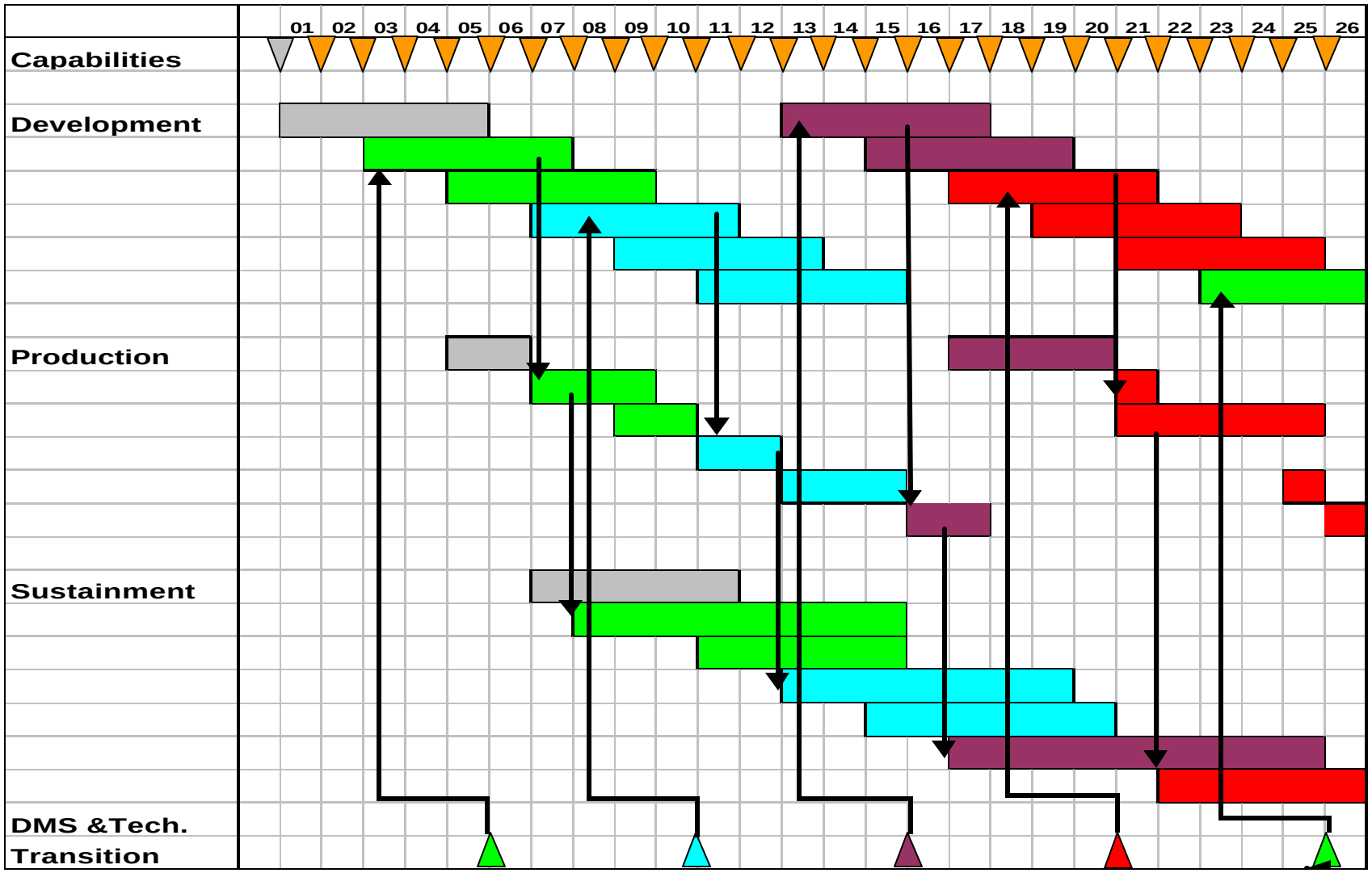

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Agenda

- Aircraft / avionics viability challenges
- Viable Combat Avionics (VCA) initiative
- Activities to date
- Closing comments

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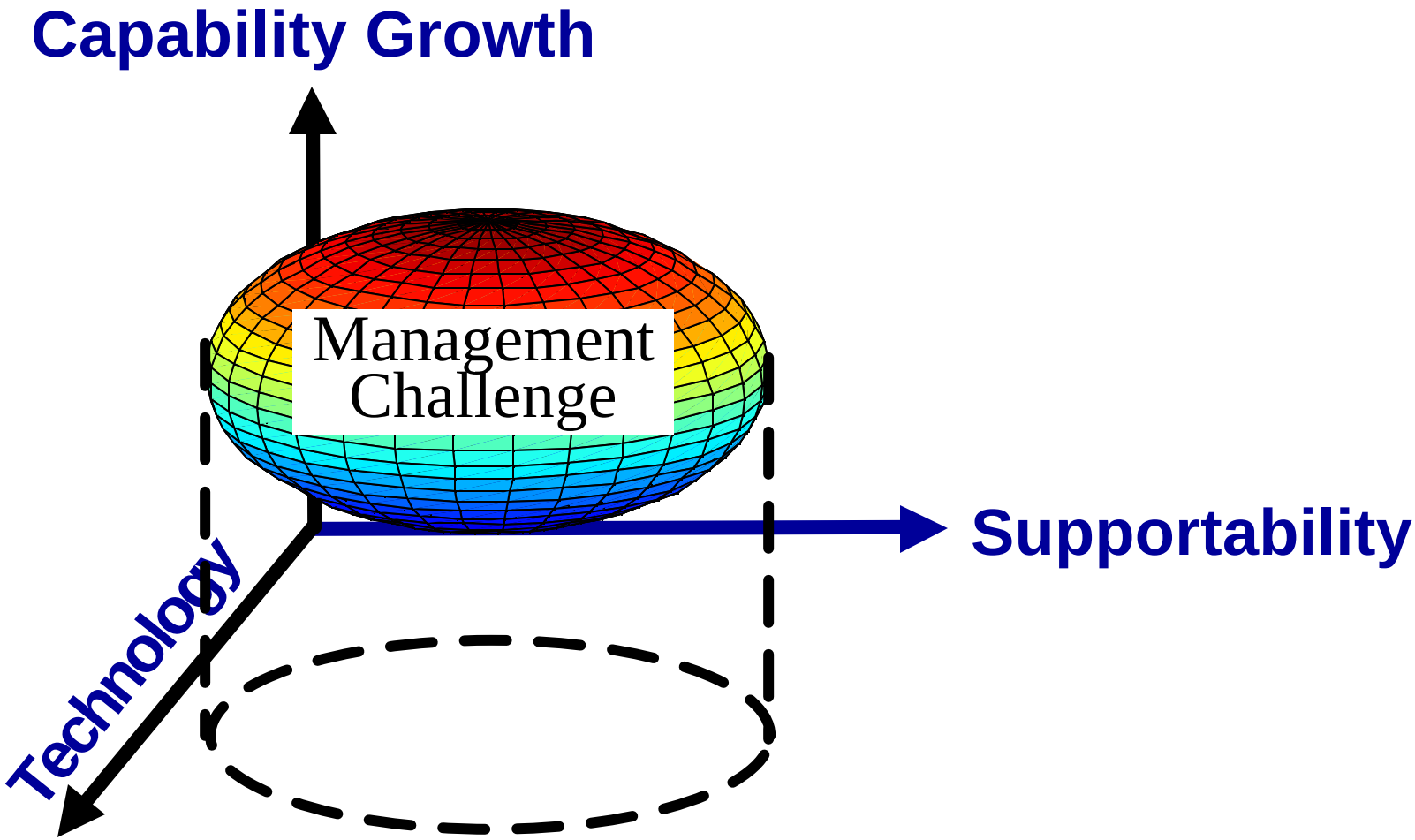
Avionics Viability
Required Balanced View



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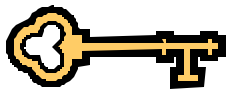
What We Want - Avionics Viability

Avionics that support the system's *current* and *future capability* and *affordability* needs

- ***Ease of expansion*** **- to accommodate capability upgrades**
- ***Ease of verification*** **- of capability changes**
- ***Ease of production*** **- without substantial non-recurring investment**
- ***Ease of technology insertion*** **- to improve reliability, reduce acquisition costs, and/or reduce support costs**



A key enabler: "Open Systems" -- designs and implementations that are easy to change and permit easy verification of changes

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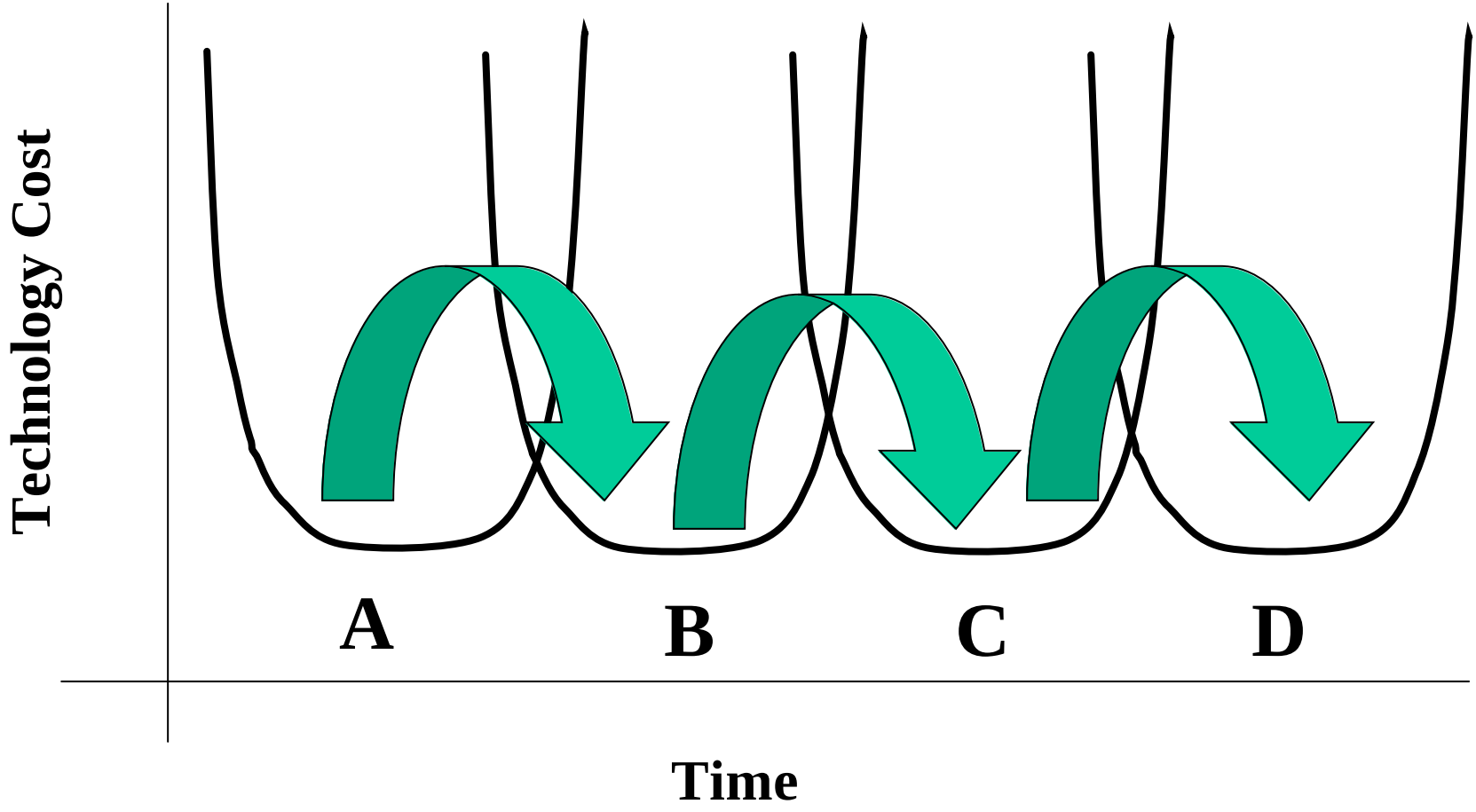
Ease of Technology Change Critical Affordability Issue



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Avionics Viability Strategy

- **For weapons systems in the field**
  - **Assess avionics viability - based on projected capability updates, parts obsolescence, technology forecasts, repair costs**
  - **Develop Integrated Change Roadmaps - evolutionary viability migration plans to improve viability**
  - **Execute Integrated Change Roadmaps - leverage capability and sustainment investments**
- **For future systems**
  - **Baseline viability expectations - reflect in system performance specifications**
  - **Execute source selections with avionics viability in best value assessment**
  - **Incentivize execution of viability strategies**

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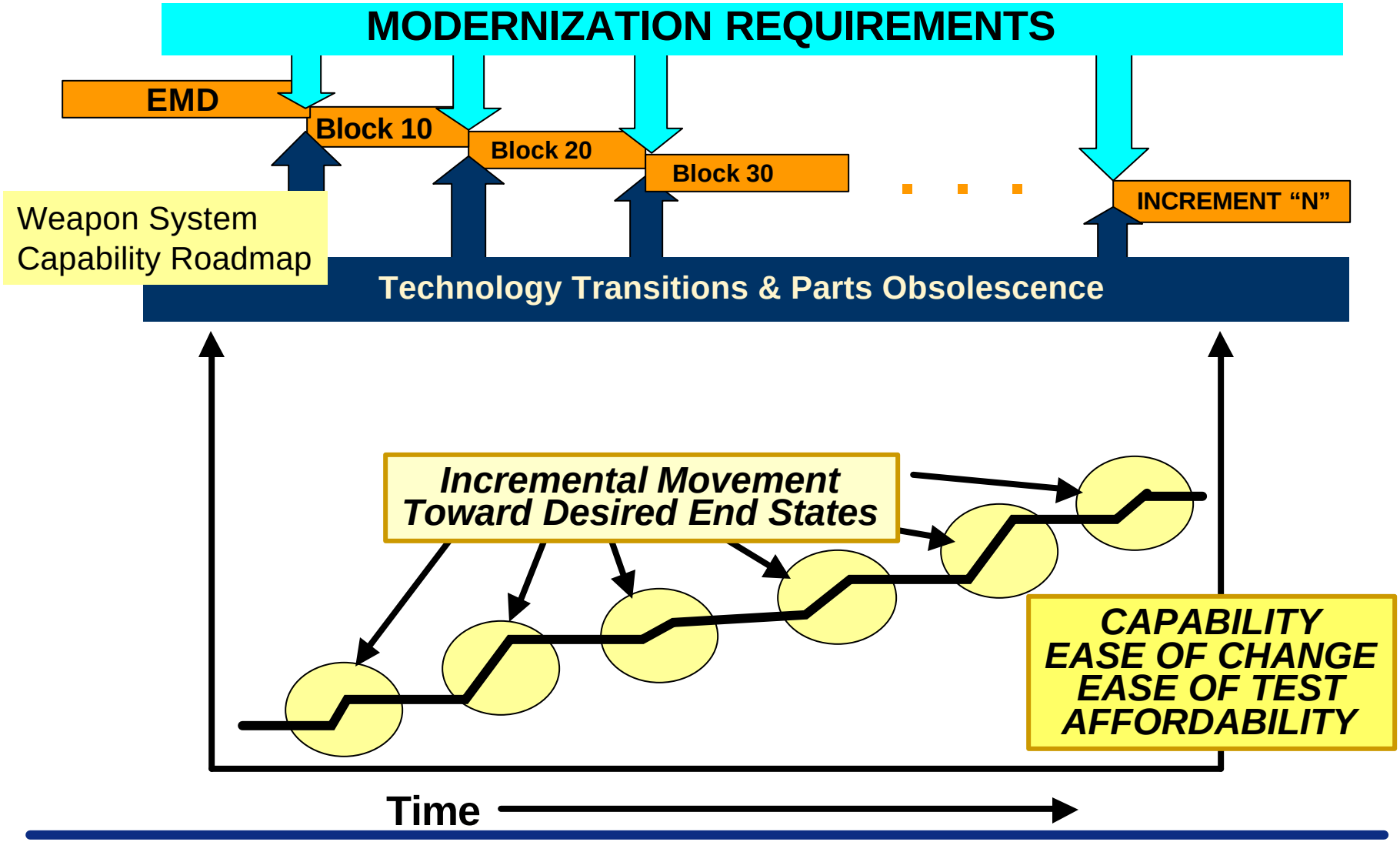
VCA in Weapon System Capability Roadmaps



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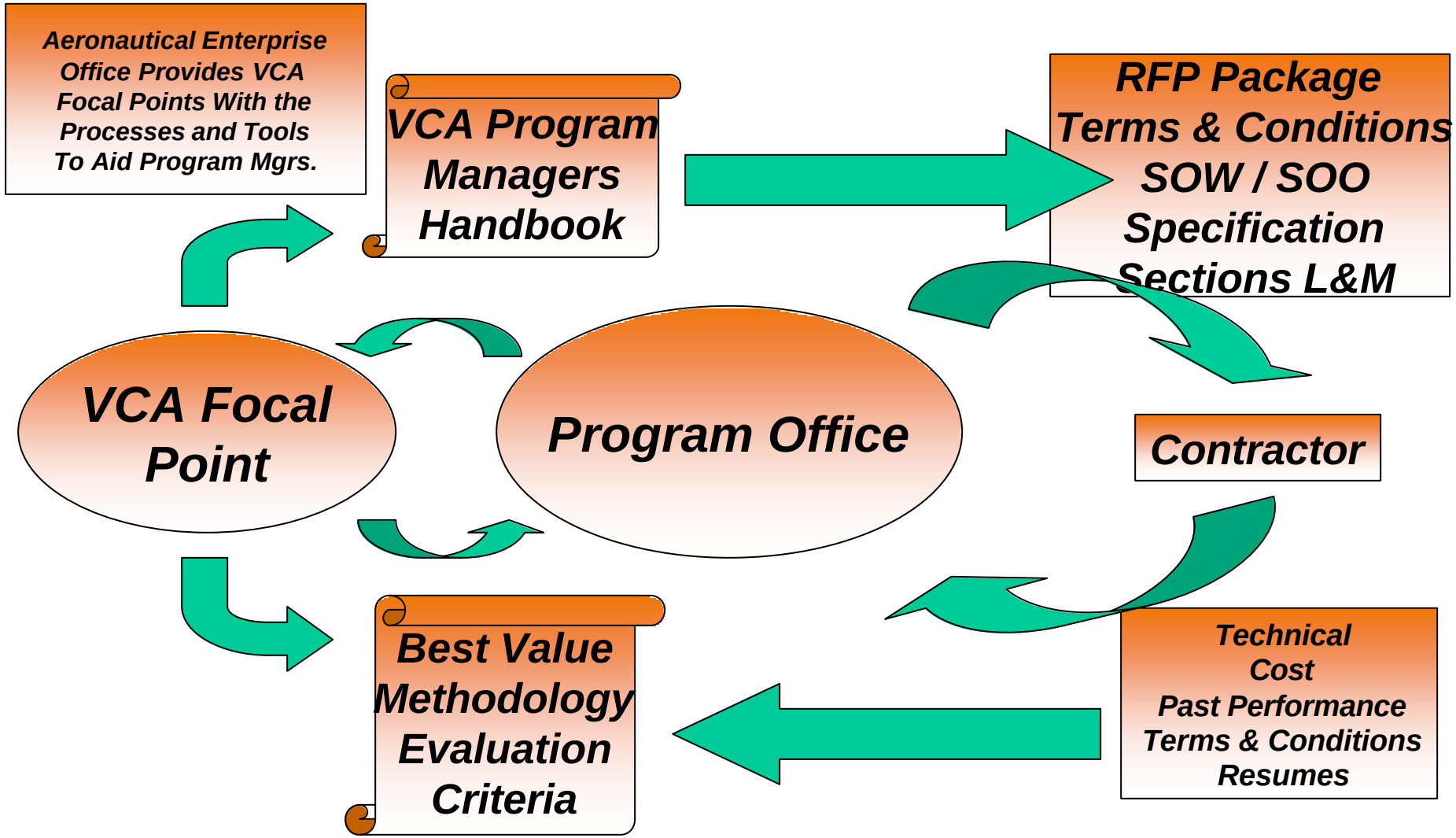
VCA in the Source Selection Process



Viability Assessment Areas

For the projected life cycle of the weapon system:

Producibility - Ability to produce the subsystem in the future based upon the "current" architecture and design implementation. (Production & initial spares, not replenishment spares)

Supportability - Ability to sustain the subsystem and meet the required *Mission Capable* rates. This includes repair and resupply as well as non-recurring redesign for supportability of the "as is" design implementation and performance.

Future Requirements Growth - Ability of the subsystem to support projected *combat capability requirements* with the "current" design and avionics architecture. This includes capability implemented by software updates.

Viability Assessment Draft Questions

1. Business Strategy

Growth (G)
1.G.1 Redesign and/or procurement of changes.
How do the offeror's strategies maintain proactive Viable Combat Avionics (VCA) initiatives for combating obsolescence and minimizing resources for changes? Response should include but not be limited to:
identifying & managing the impact of high rate of turnover components/technologies
ensuring lower tier suppliers proactively identify and manage the impact of high rate of turnover components/technologies
leveraging commercial technology investment to support changes vs a reliance on investment from the gov't
integrating supplier product upgrade plans with regards to component modification and/or replacement
1.G.2 Verification/Certification
How does the offeror's strategy minimize verification and certification resource requirements? Response should also include but not be limited to an explanation of how responsibilities are allocated between prime and vendors and an explanation of what t
1.G.3 Weapon system interface compatibility
How does the offeror's strategy address the impact of changes to and from interfacing parts of the weapon system; e.g., training systems, weapons, mission planning systems, and so on?
Producibility (P)
Sustainment (S)

2. Processes

3. System Design & Development

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Draft Section M Language (Ratings)

EXCELLENT

- Response demonstrates comprehensive understanding of challenges, all disciplines & program phases
- Superior strategy for integrating program's roadmap & plans
- All projected required resources relating to VCA are planned and programmed
- Incorporates VCA approach in contractual documents

GOOD

- Response demonstrates reasonable understanding of challenges in all disciplines and program phases
- Feasible and executable strategy for integrating program's roadmap & plans
- Adequate required resources relating to VCA are planned and programmed
- Limited contractual coverage

FAIR

- Response demonstrates minimal understanding of challenges in all disciplines and program phases
- Weak strategy for integrating program's roadmap & plans
- Minimal VCA resources planned and programmed
- Minimal contractual coverage

POOR

- Response provides no apparent understanding of challenges in all disciplines and program phases
- No apparent strategy for integrating program's roadmap & plans
- No apparent VCA resources planned and programmed
- No proposed contractual coverage

VCA Tools

- Best Value Methodology
- Integrated Change Roadmaps
- Implementation Maturity Model
- Implementation plans

BVM Implementation

- **Best Value Methodology (BVM) used in source selections**
  - **Considers *program life* view, not just instant contract**
  - **Award fee incentives**
  - **Validated through V_A (viability assessment) tool**
  - **Beta tested**
    - C-130 Avionics Modernization Program, ALR-69 Radar Warning Receiver Precision Location And Identification (PLAID), Multi-Platform Common Data Link (MP-CDL), & F-35
  - **Prototyped on B-2 avionics upgrades**
  - **Tested on Solid State Digital Video Recorder**

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Integrated Change Roadmap

- Integrates development, verification, production, support, and future capability needs into single strategy
- Developed by each program for life of program
  - Used to set program plans and long range architecture needs
- Recommending that they become part of *Request for Proposal*
  - Solution viability evaluated against integrated change roadmap

Evolve weapon system capability roadmaps into weapon system-centric integrated change roadmaps

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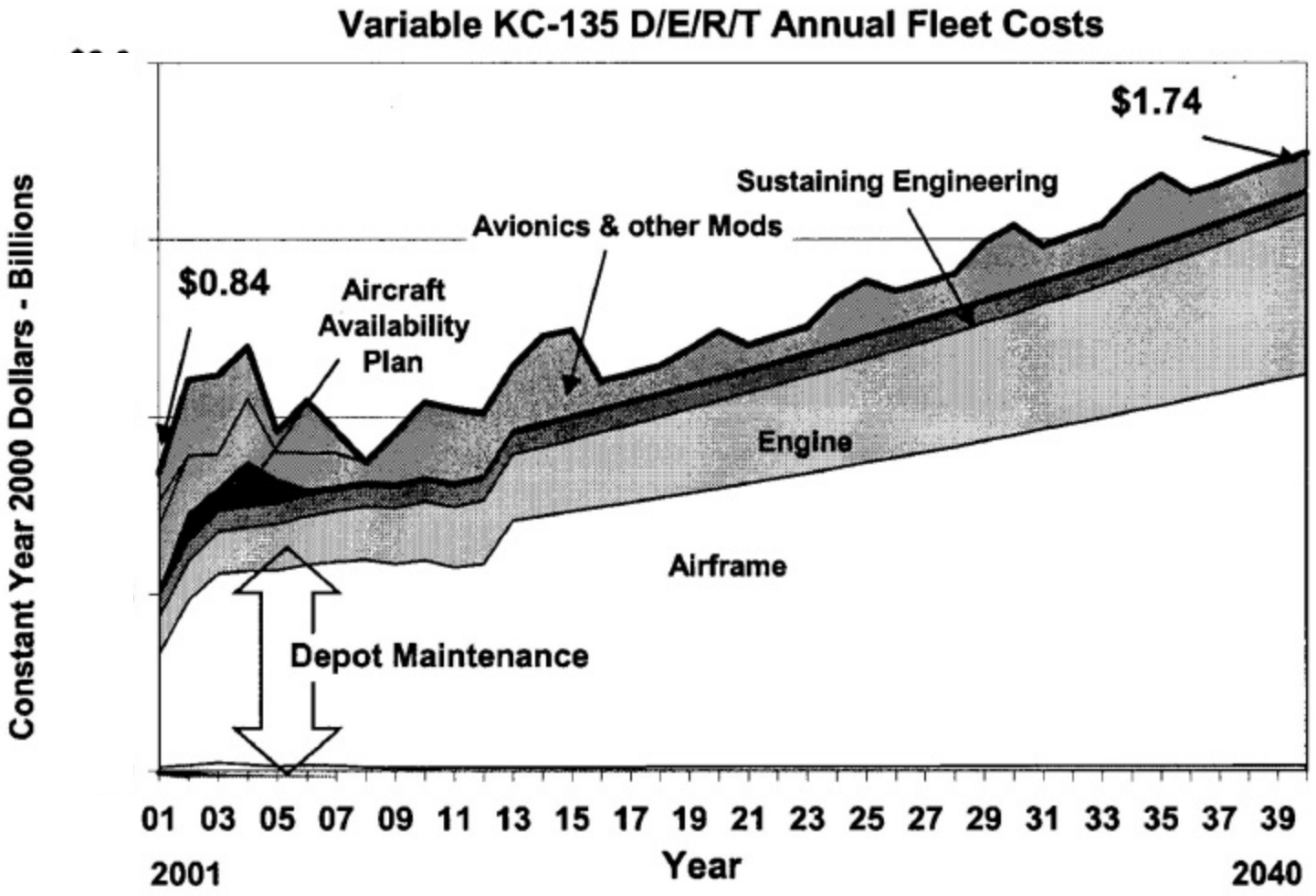
Integrated Change Roadmap
KC-135 Example



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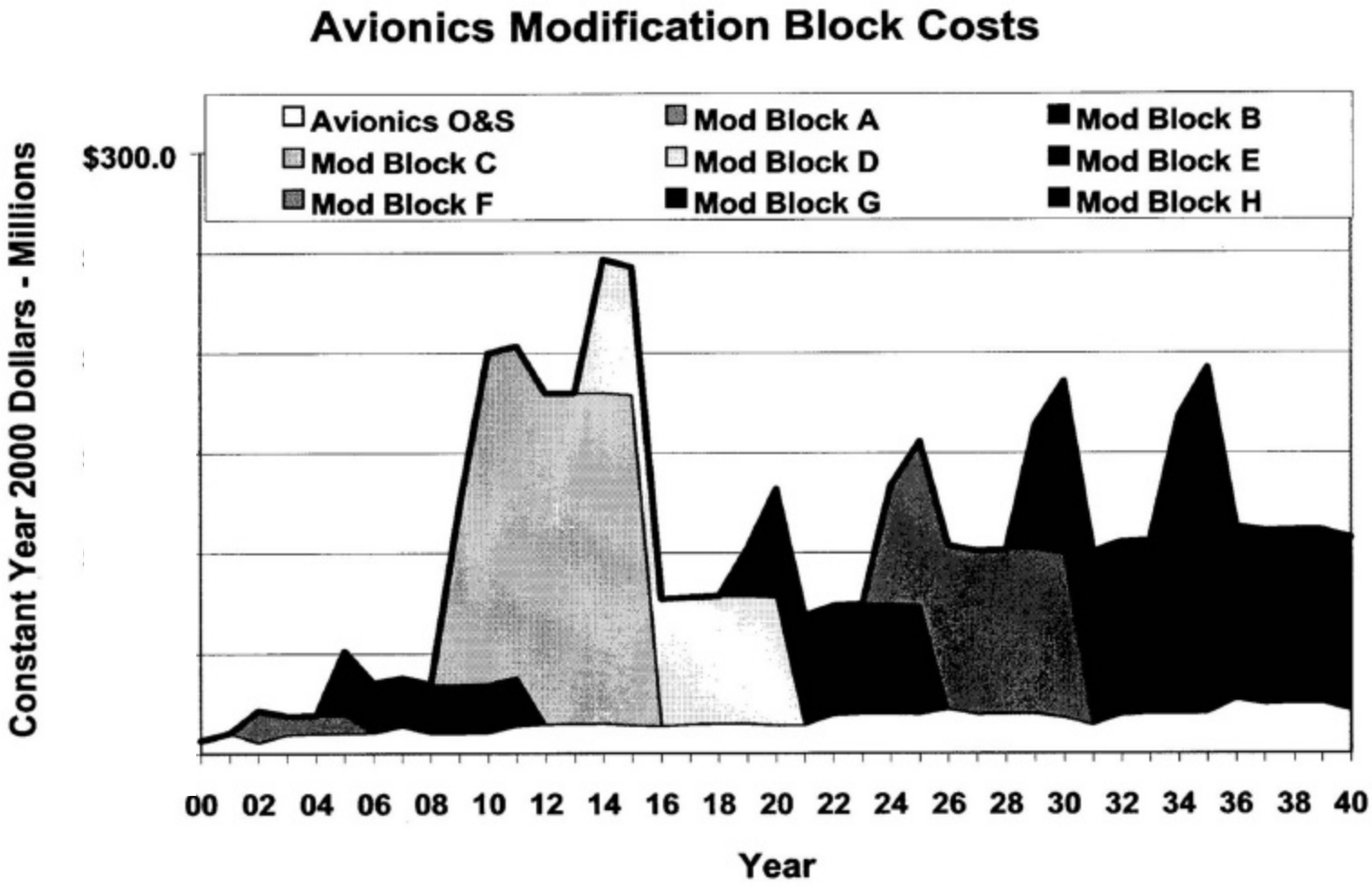
Integrated Change Roadmap
KC-135 Example



VCA Implementation Maturity Model

Maturity Level	Description
5	Multiple iterations of roadmap executed on at least one subsystem
4	Execution of roadmap on at least one subsytsem
3	Integrated Change Roadmap developed
2	VCA assessment performed, integrated change roadmap developed
1	Key individuals in program office trained in VCA process

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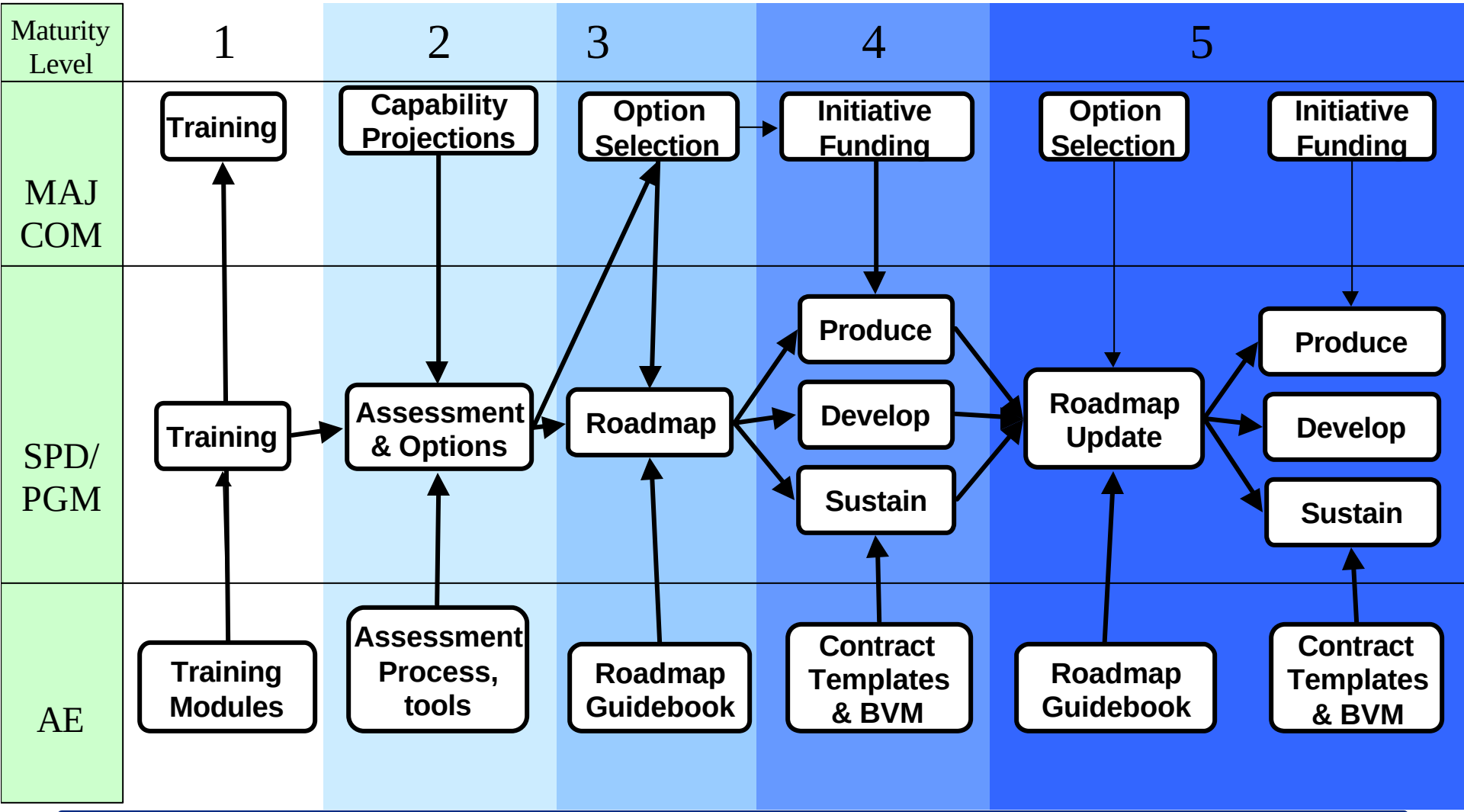
VCA Implementation Plan



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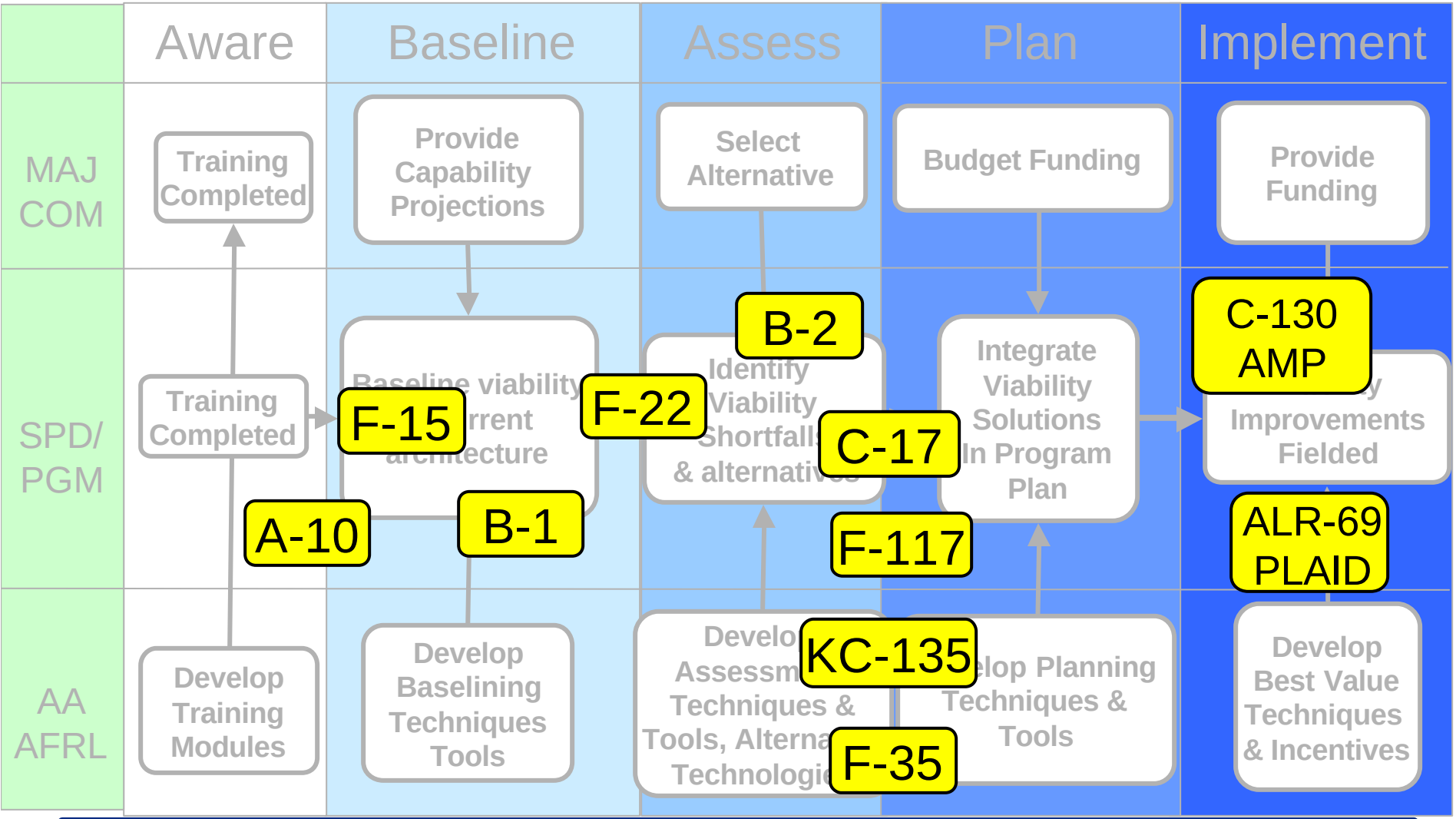
VCA Implementation



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Agenda

- Aircraft / avionics viability challenges
- Viable Combat Avionics (VCA) initiative
- Efforts to date
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Summary

- **VCA strategy: Avionics affordability with agility**
- **Senior Leader support required**
  - **Include *viability* as a threshold requirement for mods and new systems in all ORDs**
  - **Direct VCA into weapon system capability roadmaps**
  - **Provide VCA accountability through PEO/DAC chain**
  - **Assess VCA execution in periodic reviews**
  - **Advocate funding and with Industry**
- **Executing now**
  - **Can accelerate implementation with support**

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Implementation Roadblocks

- **Near-term vs long-term program management**
  - Near term plan for instant contracts only
  - Sporadic long term planning depends on personality
  - Ops tempo, current contract, execution issues take precedence
- **Acquisition & sustainment funding stovepipes**
  - O & M dollars focused on today's execution
  - Production dollars building systems and parts
  - Development dollars focused on long term upgrades
  - No connection between current problems and long term solutions with appropriate dollars
- **VCA tools, techniques & manpower funded only from "opportune" Congressional inserts**

Universal problem - VCA strategy available, yet not directed or funded to any aircraft

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Bottom Line

- "Avionics" is a key to future capabilities
- Avionics cost trends are in the wrong direction
- VCA initiative
  - Our approach to a solution
- VCA key: Incentivize long term performance and affordability into the contract at hand
  - Ease of change
  - Ease of verification
- *Requires direction from higher headquarters and accountability in execution to fully realize benefits*

BACKUP SLIDES

Current Life Cycle Model

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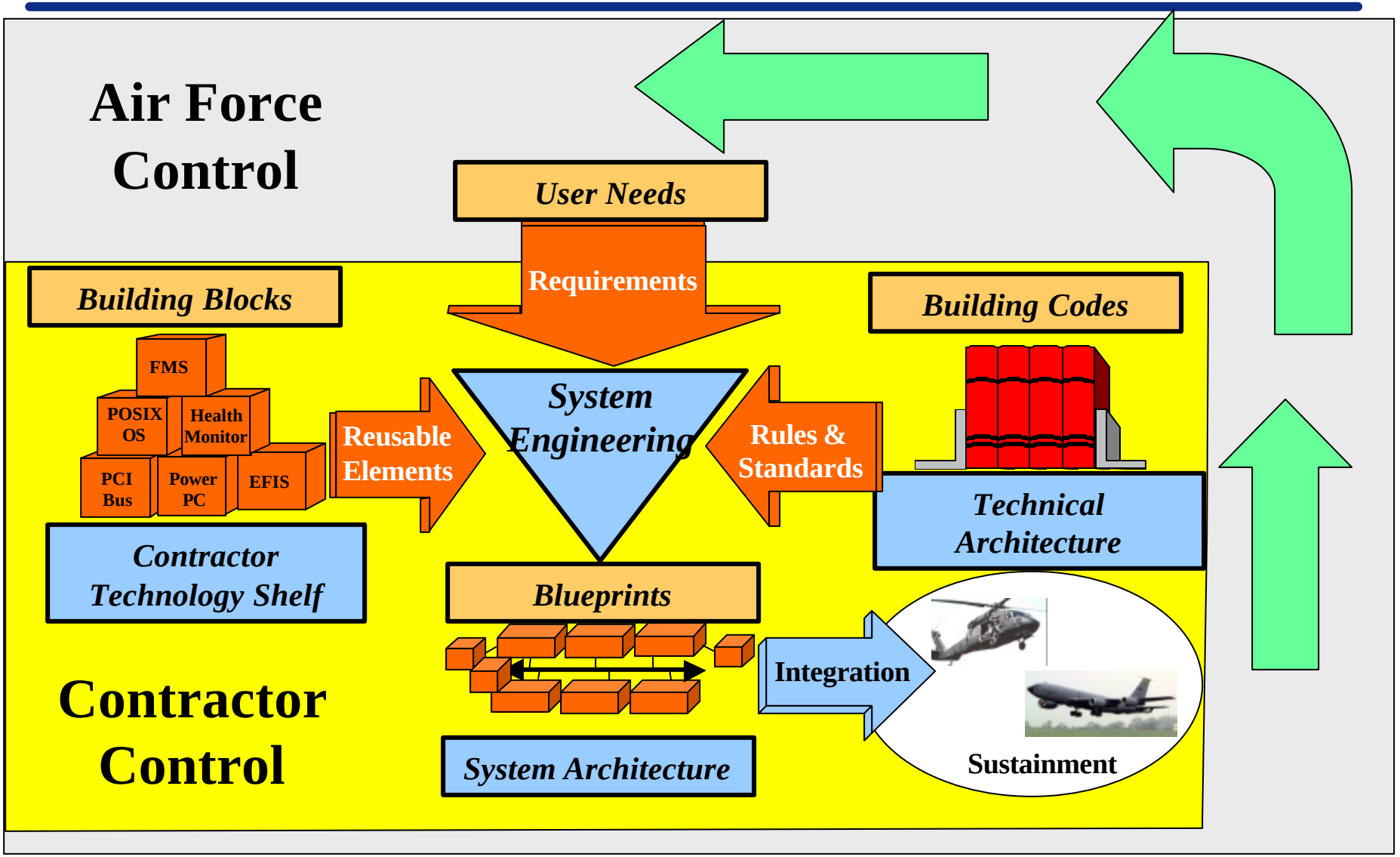
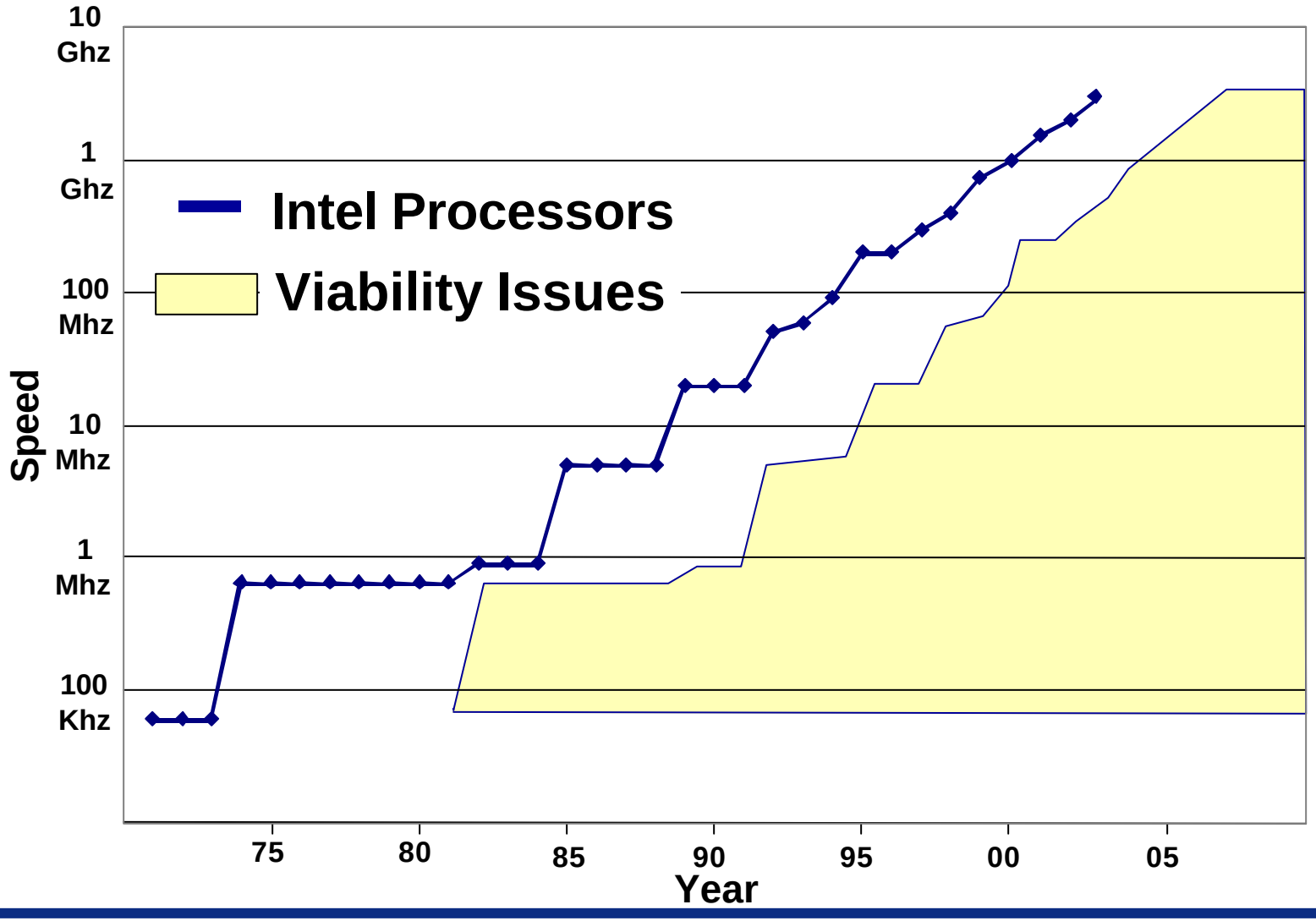


Capability Update Rates

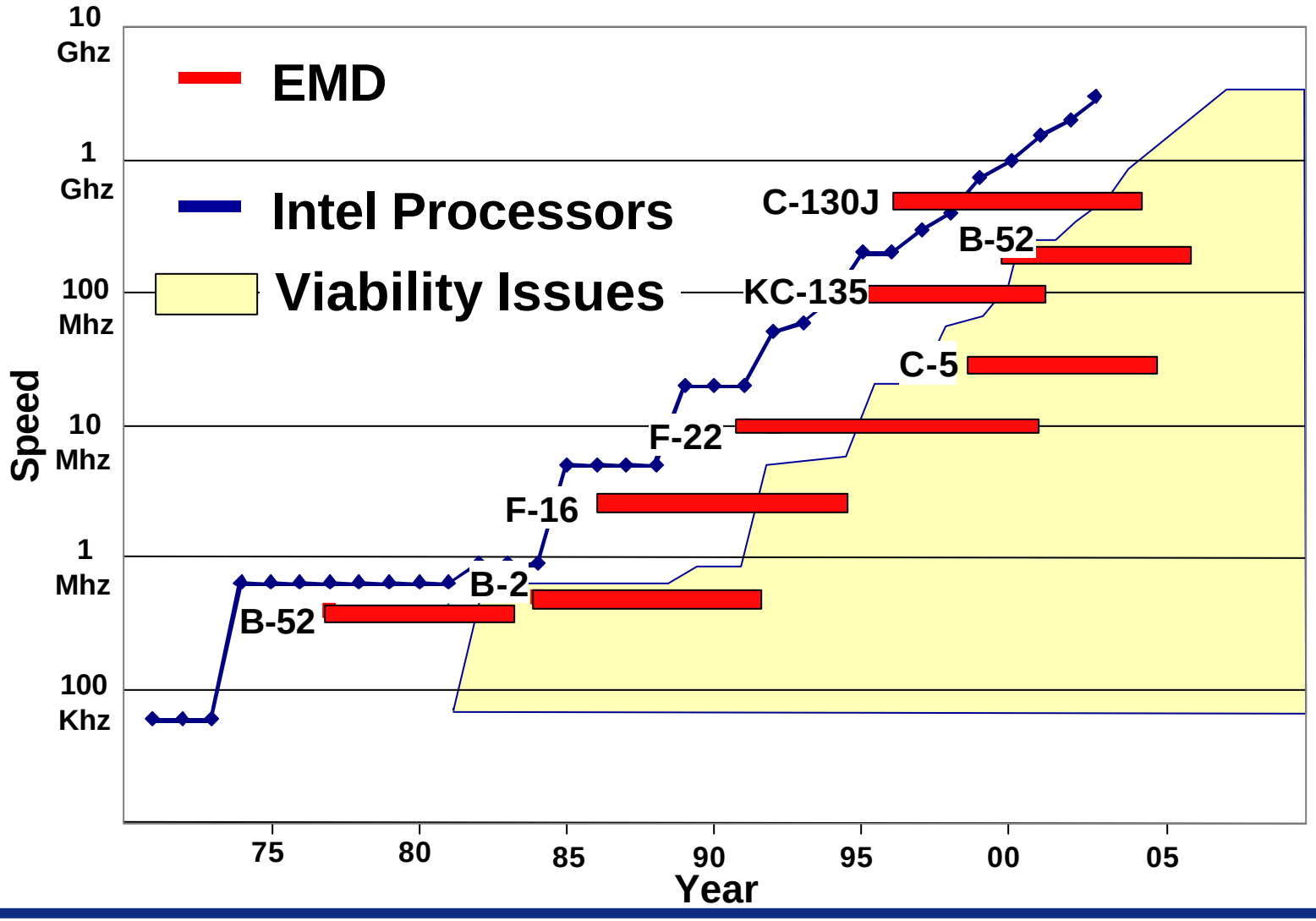
- 18 - 36 month OFP updates
- New weapons integration
- Systems of systems interoperability upgrades
- Civilian airspace re-architecture
- B-1 weapon capability upgrades:

		Capability
Original	xx - Mk 82, Mk 62	Now
Block C	xx - CBU 87, 89, 97	Now
Block D	xx - JDAM	Now
	xx - xxxx	2003
Block E	xx -xxxx	2004
	xx - xxxxx	2004
Future?	xx - xxxxx	TBD

Technology Turnover Trends



Processor Trends



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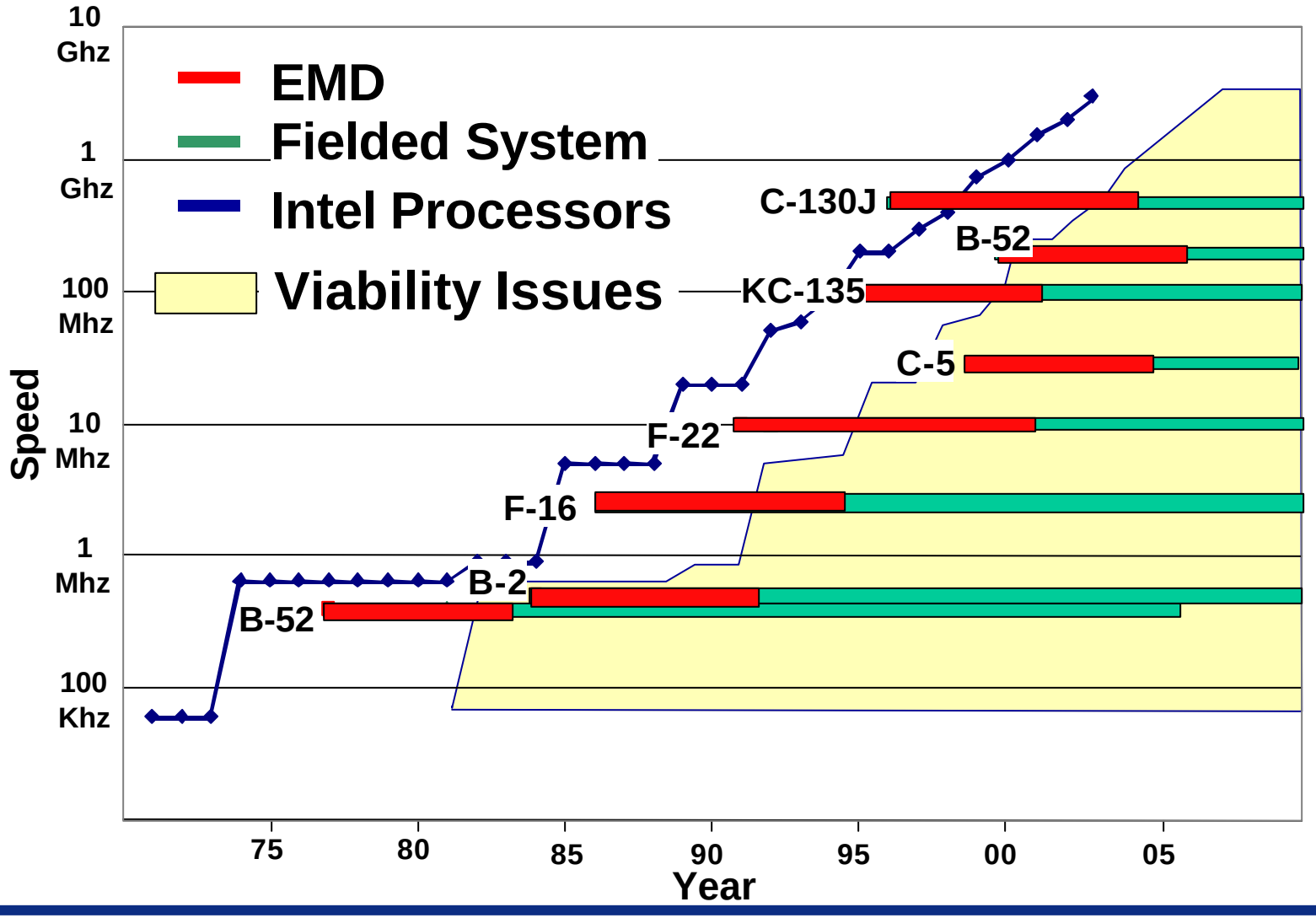

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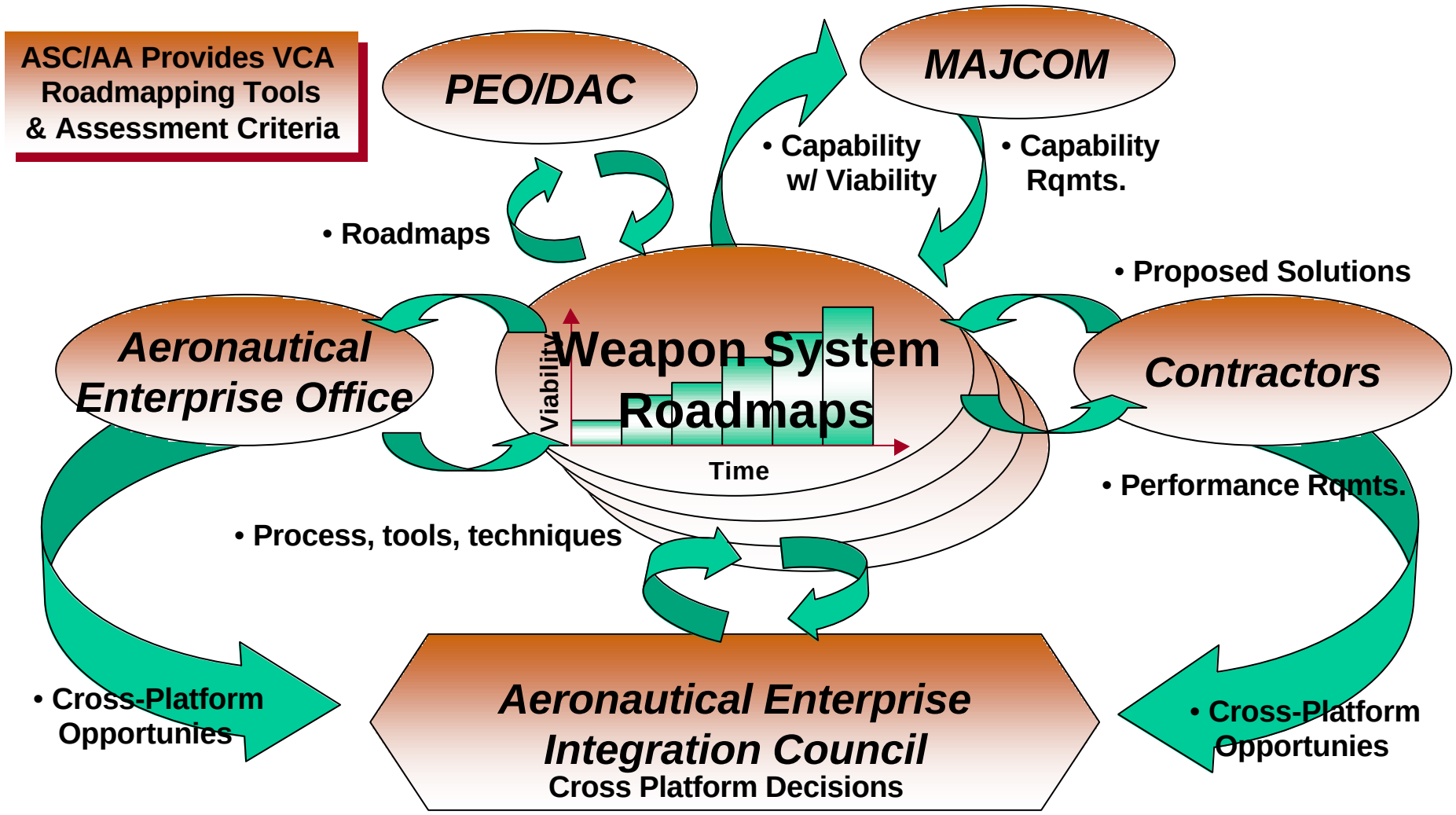
Weapon System Roadmap Development Process



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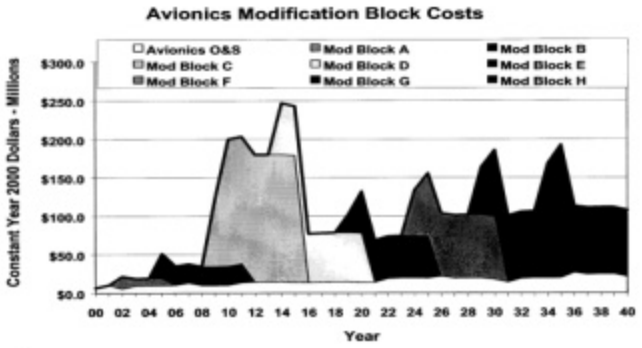
Integrated Change Roadmap
KC-135 Example



Modification Block Overview (See Appendix 1 for Acronyms)

Mod Block A — **2002–2005**

- GPS Receiver Application Module
- Mode S with Down Link Down Parameters (DAP)
- Enhanced Traffic Collision and Avoidance System (ETCAS) " Whisper Mode"
- Aeronautical Telecommunication Network (ATN) /VHF Data Link (VDL) Mode 2

Mod Block B — **2005-2011**

- Flight Director Replacement
- Wide Area Augmentation System (WAAS)
- Navigation Warfare (NAVWAR)
- Automatic Dependent Surveillance-Broadcast (ADS-B) / Cockpit Display of Traffic Information (CDTI)
- Local Area Augmentation (LAAS)
- Co-Pilot Instrumentation Power System (CIPS) Upgrade
- Radar Altimeter Replacement

Mod Block C — **2009–2015**

- VDL Mode 3
- Identification Friend or Foe (IFF) Mode 5
- CDTI Enhanced Graphics
- Engine Instrument/Caution Advisory System (EICAS)
- Real Time Weather
- Aircraft Defensive Systems
- Required Navigation Performance (RNP) – 1 Operations
- Required Time of Arrival (RTA) >10 sec
- VDL Mode 4
- Joint Tactical Radio System (JTRS)
- Enhanced Airline Operational Communication (AOC), Enhanced Data Link , HF Messenger
- Military (M) – Code GPS
- Link 16
- Primary Power System Upgrade
- Second Satellite Communication (SATCOM)

Mod Block D — **2014-2020**

- On-Board Video
- RNP<1 Terminal Procedures
- Full Aircraft/Fuel Performance Management
- Real Time Information in the Cockpit (RTIC)/Real Time Mission Planning
- Enhanced Maintenance Operations, Aircraft Health and Utility Monitoring (On-Conditioning Maintenance)
- Enhanced Maintenance Operations, Avionics Fault Detection/Fault Isolation Enhancements
- Enhanced Maintenance Operations, Electronic, On-Board Technical Orders (T.O.'s)
- Enhanced Safety, Digital map, Enhanced Ground Proximity Warning System (EGPWS+), Clear Air Turbulence
- Enhanced Boom Operator, Boom Video, Avionics Upgrade

Mod Block E — **2019–2025**

- Enhanced Safety & Situational Awareness, Heads Up Display/Guidance (HUD/HUG)/Synthetic Vision/Voice Recognition
- Broadband Data, Wireless Information / Internet Access

Mod Block F — TBD — **2024–2030**

Mod Block G — TBD — **2029-2035**

Mod Block H — TBD — **2036-2041**